FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 212. (No. 3, Vol. V.) JANUARY 18, 1913. [Registered at the G.P.O. as a Newspaper.] [**Weekly, Price 3d. Post Free, 3½d.**

Flight.

Editorial Office: 44, ST. MARTIN'S LANE, LONDON, W.C.
Telegrams: Truditur, Westrand, London. Telephone: Gerrard 1828.
Annual Subscription Rates, Post Free.
United Kingdom ... 15*s.* 0*d.* Abroad ... ... 20*s.* 0*d.*

CONTENTS:

EDITORIAL COMMENT.

Capitalists, Advance!

We would draw our readers' attention to a letter appearing under the pseudonym "A Believer in Aviation and in England" in our correspondence columns. While the writer of the letter in question desires to remain anonymous, we can at least assure our readers that it originates from a source that should command their respect, and that it presents a true version of the case we have no shadow of doubt. What our correspondent says in his letter is that unless the British section of the movement obtains adequate financial support very speedily, it is in danger of losing several of its best engineers, and that at a time when it most needs their experience and assistance. The really serious part of the situation, to our mind, is that disclosed by the letter in reference to the difficulty that some of the smaller manufacturers are experiencing in financing orders actually in hand. Such a state of affairs is a handicap indeed on British enterprise, and surely it ought not to continue. No one can doubt for a moment that aeroplanes must increase and multiply with immense rapidity in the near future; and if the year 1913 only evolves a marked advance in the safety of flying, we firmly believe that thereafter the development will outpace all previous records.

It is, we are firmly convinced, on the safety of the art that most depends at the present time. Repeated accidents have tended to scare the public, and capital is perhaps more sensitive to a public scare than anything. Without doubt, flying must become less dramatic and more secure if the industry is to receive the financial encouragement that it so well deserves and is to establish itself on a firm footing as a regular and profitable business.

In those days the capitalist will be sorry that he did not get in on the ground floor, and the large firms who then begin to think of opening an aviation department will cast their eyes round in vain for engineers with the experience of what *not* to do. Any day of the week there are always plenty of men with brilliant ideas who are willing to fill vacancies and turn out designs that will keep the factories of the world busy for ages on something new, but, as we have been at pains to explain in preceding articles, it is not the original *chef d'œuvre* of the inventor that makes the money, except in so far as it serves as a model to be copied in quantity.

There are at the present time several engineers of acknowledged experience in aeroplane design and construction, and it is of first-class importance to England that they should remain in the industry. Their brains and experience, particularly the latter, represent an asset to the country that will be absolutely irreplaceable if they are forced to quit. Even now there are orders enough to justify capital being invested as a business venture quite apart from the question of speculation. The Government is now definitely embarked on the maintenance of a Royal Flying Corps, and it must be self evident to any thinking person that every nation of consequence will of necessity have to keep its aerial army in a state of the highest efficiency. Aeroplanes will be wanted in increasing numbers, and, whether they are perfect or not as machines, they will have to be bought. So soon, however, as the death-roll becomes a less conspicuous feature of the movement, the mere utility of the flying machine will begin to assert itself as a vehicle of potential possibilities to commercial enterprise. We do not suggest that the commerce is likely to

be of the kind humorously portrayed in our Christmas cartoon, nor do we pretend to specify what precise openings aeroplanes might have in the commercial world at present. If their possibilities were so apparent as to need no discovery, it would not remain for commercial acumen to realise that they exist. People may be as sceptical as they please, but the fact remains that the aeroplane can accomplish things that are impossible to any other sort of vehicle, and those accomplishments are certain to be turned to account sooner or later by anyone who can see a way of making them profitable to himself.

It does not matter that the aeroplane experiences a resistance in flight of approximately one-sixth of its weight, whereas a railway train is opposed by a fraction more nearly in the order of one-hundredth; there will still be a use for the flying machine so long as it can accomplish journeys that are either impossible to other vehicles or such as would involve very much greater time. Take for example the case of some of the mining districts in different parts of the world. Mines are often situated several miles from the nearest town, and the intervening country is frequently of the kind that makes rapid transit impossible. Journeys between the two centres are nevertheless frequent and regular; moreover they often call for haste. Time is money in most businesses, and where the aeroplane is capable of saving time it is potentially capable of making money. There are undoubtedly many such situations in the commercial world to-day, but it is not to be supposed that they will be realised all at once. One can imagine the surprise, for example, that would be caused if the resident engineer of the Camp Bird requisitioned his board of directors in London for an aeroplane, yet the day will come when something of an analogous order will happen. Then we shall see commercial enterprise stealing a march on conservatism and making profit in the manœuvre. Others will follow suit, and so the business will spread.

It all depends on the safety of the undertaking, however. By this we do not mean that an aeroplane must necessarily become as safe as an armchair, or that it must be impossible for a fool to break his neck in it. What we mean exactly is that flying must cease to be associated with the singularly acute risks that have so unfortunately become identified with it in the public mind.

In our opinion flying has reached a stage in which phenomenal exploits by individual pilots no longer advance the cause in proportion to the risk undertaken. This time last year the reverse was, in our opinion, the case. The wonderful performance of Beaumont and Vedrines in the Circuit of Britain put a finishing touch to the grand effort of Paulhan in the London to Manchester flight of the year before. From Lilienthal to the brothers Wright, and from Farman, Delagrange, and other pioneers to these highly skilled pilots of aircraft, the personal art of aviation might be traced through successive stages of individual progress. Machines improved apace, too; the essential features in design became better understood; and finally the construction reached a point at which the aeroplane could be made to do almost anything when sufficient skill was applied to the lever.

During the past year, however, the Beaumonts and the Vedrines have multiplied until the experienced pilot is no longer uncommon. At any time of the day, and any day of the week, some aviator may cause a mild sensation by beating a record. But the records are already so great in themselves that one scarcely realises the merit of the last performance, and the public as such is undoubtedly beginning to lose concern.

It is this lack of public interest that is reflected in the lack of capital. The directors of companies who might be interested are human beings like ordinary men, and they take their cue when it comes to them. What do they find? They open their newspapers, and they may perchance see that Garros has added another thousand feet or so to the height record; but, by chance also, the event may escape notice, for such things have long since been relegated to the status of paragraph news. But, if there is an accident, they are sure to hear of that. In this world of sensation the dramatic and the fatal in life have an asset from the newspaper point of view, and in consequence are made much of in the daily Press. At the dinner-table, if anyone speaks of flying, it is only too frequently that they feel called upon to preface their remarks with the words "How sad!"

Clearly this is not the atmosphere in which even the spirit of speculation is likely to be born in the heart of the financier, while as to the idea of doing a steady business in aeroplanes, it would never so much as enter his head.

It will be another story, however, when the uninitiated is induced spontaneously to remark, "How much safer this flying has become."

The blindness of the majority is the minority's opportunity, however, and there are surely several people in the world who think sufficiently clearly to be able to see through the present mist. Among them some surely have the necessary capital themselves or can influence appropriate finance; to those we make our appeal on behalf of the British engineer and designer.

Negative Wing Tips for Stability.

By one of those coincidences that are less singular than is generally recognised, yet not the less remarkable on that account, an article on negative wing tips and stability written by Mr. Hume-Rothery, M.A., B.Sc., arrived at this office within a few hours of the printing of Mr. Berriman's article in last week's issue, not long before any copies were circulated to the public.

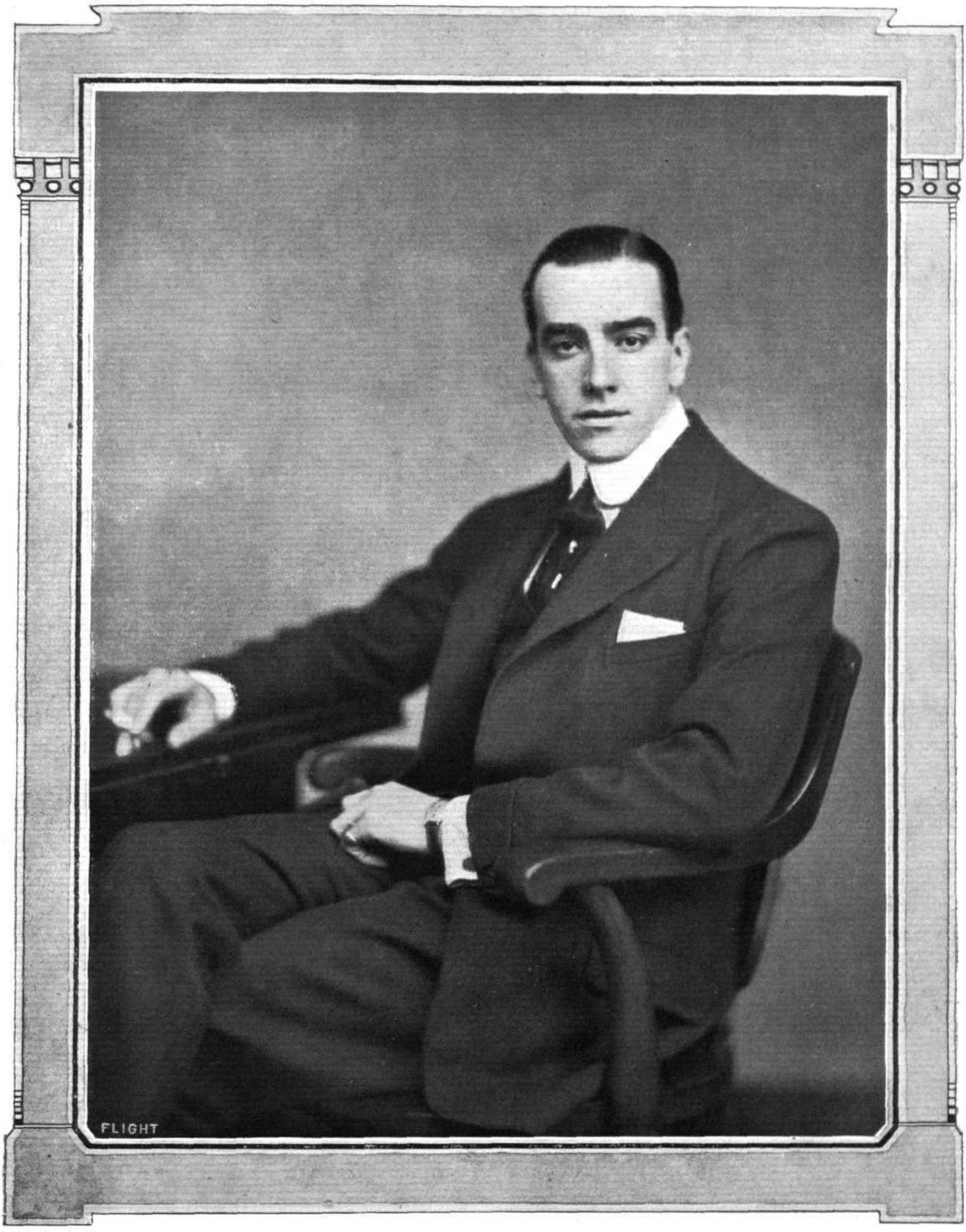
Mr. Hume-Rothery's work has the greater importance in that it treats the question with the proper regard to the fine mesh of the mathematical net that one expects from a Cambridge wrangler; and so provides a basis for quantitive analysis, out of which designers can evolve definite dimensions for their own machines.

Although so different in method of treatment, both articles arrive at the same essential conclusion as to the stability of the negative wing tip. By negative tip, be it thoroughly understood, is meant a down pressure thereon; not merely the "wash-out" of a positive lift by the giving a slightly negative angle of incidence to a cambered plane or by slight upturning of the wing corners for the same purpose.

The significance of the above statement can better be appreciated when it is remembered how fundamental in modern aeroplane design is this principle of warp *cum* rudder that it seeks to upset. The Wrights realised from the very first that lateral and directional stability were inseparably connected in aeroplane wings as they knew them. From this fundamental association, they saw the necessity for the simultaneous use of the rudder with the warp, and this principle has been the essence of the successful control of all aeroplanes fitted with wing balancing apparatus, whether in the form of the warp or ailerons.

By locating in the positive wing tips the crucial link of the connection between lateral and directional stability,

MEN OF MOMENT IN THE WORLD OF FLIGHT.



MR. CLAUDE GRAHAME-WHITE, who has led the way so splendidly in popularising aviation by the establishment of the London Aerodrome at Hendon. He also, amongst many other flying achievements, brought home to Britain from America the Gordon-Bennett Aviation Trophy in 1911.

Mr. Berriman was led to realise that means were available for its destruction in the use of negative (down pressure) tips. Negative wing tips thus potentially serve as a means of removing the cause that has made the Wright system of warp *cum* rudder control hitherto essential to all constructors of orthodox machines. How essential, can only be grasped when it is clearly recognised that the rudder is not *in itself* a steering organ.

Alone among designers, Mr. Dunne has avoided the need for the Wright combination, and his machine, unquestionably, has negative (down pressure) tips. It also has retreated wings, and in the *down turned* surface of the lee tip that is exposed by the *retreated* wing to an oblique wind lies what has generally been assumed to be the basis of the Dunne stability. The arguments of Mr. Hume-Rothery and Mr. Berriman go to show, however, that the theory of negative wing tips for lateral stability has nothing to do with retreated wings; in fine, that they can equally well be applied to the straight wings of any modern machine.

Everything depends on the accuracy of the hypothesis in these theories, and it is interesting to note that Mr. Hume-Rothery's definition of a "partial horizontal gust" is in effect the same as Mr. Berriman's treatment of a gust as a "sudden relative spin of the wind." The isolation of the banking from the spinning movements of the wing, produced by the use of negative tips, forms, of course, the backbone of both arguments.

Added interest and importance attaches to Mr. Hume-Rothery's work in that it establishes a direct link with Prof. Bryan's book on "Stability in Aviation." This, incidentally, should be of special interest to those who recollect Mr. Archibald Low's remarks at the Aeronautical Society on the discussion on Mr. E. H. Harper's recent paper, when he urged the need for recognising the fundamental importance of a proper mathematical method, which in its function of a "machine" would provide results appropriate to the data thereto supplied.

The second part of Mr. Berriman's article appears this week, and deals mainly with the aspect of stability that is related to the inherent power possessed by positive wing tip systems of recovering their balance after a disturbance. Negative wing tips, it has been explained, potentially *prevent* the disturbance from taking place. Also we again refer to the significance of the ability to steer complete circles with fixed controls as a method that has been suggested for the practical demonstration of inherent stability, and to the absence of any need for a rudder on such a system.

* * *

Lieut. Parke's Notebook.

Acting with the highest motives towards others engaged in a pursuit that has brought them great sorrow, the relatives of Lieut. Parke have voluntarily presented for publication the extracts from his private notebook that appear in this issue.

Lieut. Parke was a pilot of singular qualities. He combined with an inborn pluck, that was never unnerved, a scientific mind that permitted him to take a studious interest in his danger up to the point of death. His dive over Salisbury Plain was an instance of this. If ever any man seemed doomed, it was the pilot on that occasion, for the machine was within comparatively a few feet of the ground before he flattened it out by reversing the rudder as a last resource.

It was a little while after this event that he started to "write up" in a private notebook his experiences with different machines. Had he lived, he would doubtless have made his review retrospective; as it is, only those machines flown since last October are mentioned. It will be noticed that he speaks very highly of the Handley Page monoplanes, on one of which, unfortunately, he met his death.

Bearing in mind the general account of the fatal fall, and the recommendation in the report of the R.Ae.C. Accidents Committee published in FLIGHT last week, one cannot help comparing the circumstances with those that attended his accident on the Cody biplane, as he describes them in his notes. There are many other incidents, too, that will be read with the greatest interest, and doubtless with much profit, by all.

* * *

What has Happened to the Report?

The revival of the discussion on the strength of monoplanes initiated in last week's issue by Mr. Griffith Brewer and continued in the current number by Mr. Howard-Flanders, reminds us that the long awaited report of the special Committee on monoplanes has not yet been published. According to Col. Seely, who said quite a long time ago that it was about to be presented, the Report must surely have been finished a great while. Why then all this delay in its publication? The ban on monoplanes continues, and the industry and the public alike have a right to know what is being done in the matter. If the Committee did indeed present its Report round about the time when Col. Seely expected it, and we presume that the expectations of a minister in respect to the work of a departmental committee are not mere guesses, then we can see no reason why everyone should have been kept in the dark so long. If the ban is being continued officially as the result of recommendations contained in the Report, it would surely be as well that manufacturers of monoplanes should know exactly how they stand in the matter. Alternatively, if the Report arrives at the opposite conclusion, then it is surely hardly fair that it should get side-tracked in its progress from the recesses of official secrecy to its legitimate issue in the light of day.

⊛ ⊛

ROYAL FLYING CORPS.

THE following appointments were announced by the Admiralty on the 9th inst.:—

Capt. R. Gordon, R.M.L.I., has been granted the temporary rank of Major while holding the appointment of Squadron Commander in the Royal Flying Corps, to date December 31st.

Capt. C. E. Risk, R.M.L.I., has been graded as Flying Officer, Naval Wing, Royal Flying Corps, to date December 5th.

Lieuts. G. V. Wildman-Lushington, R.M.A., and J. T. Courtney, R.M.L.I., graded as Flying Officers, Naval Wing, to date December 5th.

The following appointment was announced in the *London Gazette* of the 10th inst.:—

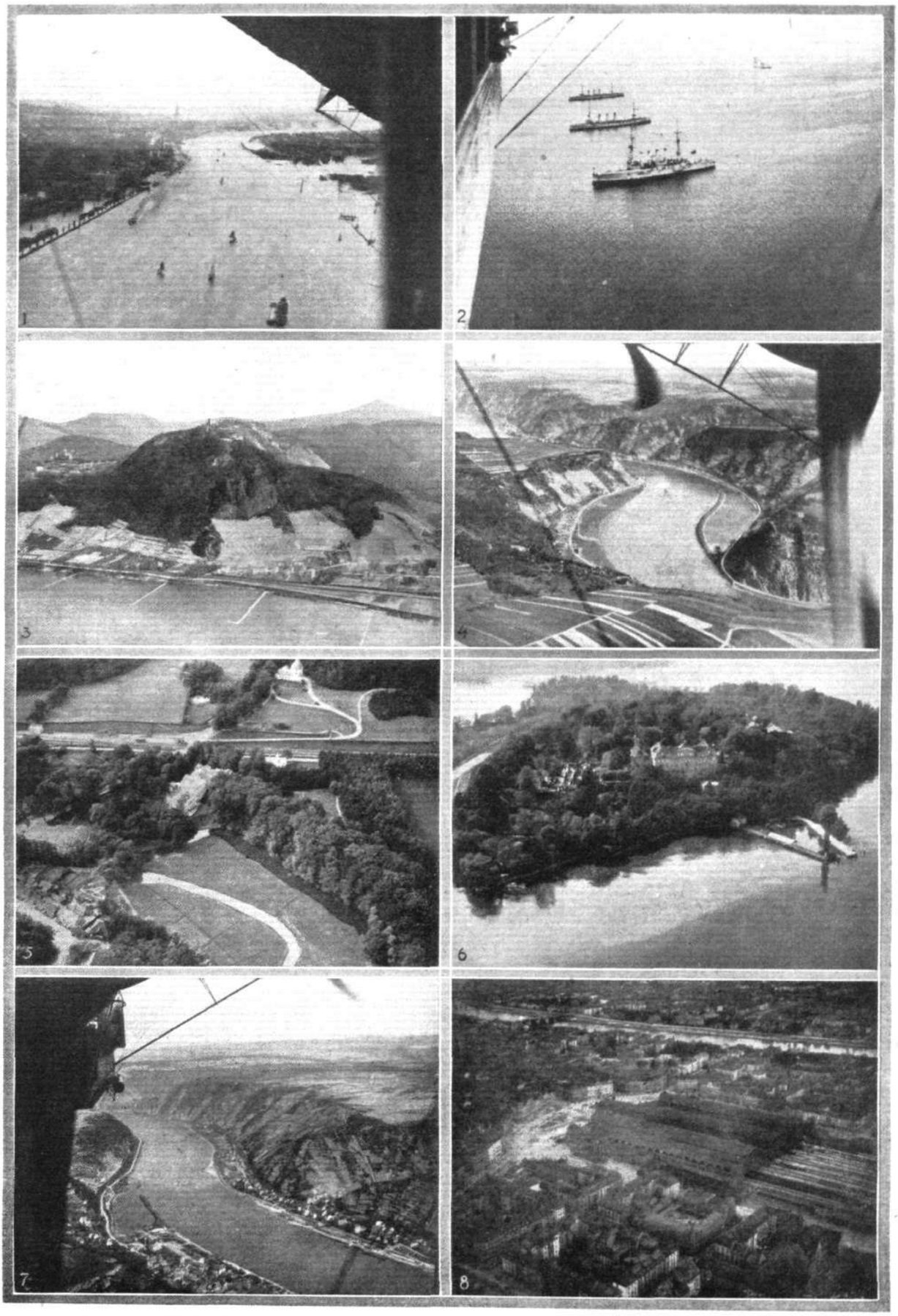
Special Reserve of Officers.—Royal Flying Corps.—Military Wing.—Sydney Vincent Sippe to be Second Lieutenant (on probation). Dated January 11th, 1913.

⊛ ⊛

ROYAL PATRONAGE FOR OLYMPIA.

IN view of the great interest taken by His Majesty King George in aviation matters, it is not surprising that the Olympia Aero Exhibition, the first exclusively aero show to be held in Great Britain, has been honoured by the extension of His Majesty's gracious patronage. When His Majesty was Prince of Wales he visited the Aero Exhibitions, and spent a good deal of time examining the various exhibits, and following the precedent set by King Edward, he extended Royal Patronage to the Aero and Motor Boat Show held in the spring following his accession.

We may remind our readers that the exhibition opens on February 14th and continues until the 22nd. All the leading British aeroplane and engine building firms will be showing their latest productions, and the French industry will be well represented. FLIGHT will be at Stand No. 26, just by the Addison Road entrance.



FROM ABOVE.—Some German views as seen from the Zeppelin dirigible "Hansa": 1. View of the river near Hamburg. 2. Above Kiel Harbour. 3. The famous Drachenfels Castle on Rhine. 4. Loreley Rock. 5. Friedrichsruh, Bismarck's country seat, with the mausoleum of the Iron Chancellor. 6. Mainau, an island in Lake Constance, the Grand Duke of Baden's summer residence. 7. St. Goarshausen-on-Rhine. 8. Central Station, Frankfort-on-Main.—*Berlin Motor.*

SOME EXPERIENCES OF FLYING IN CENTRAL AMERICA.

By G. M. DYOTT.

[ROUGHLY a year ago it will be remembered that Mr. G. M. Dyott and the late Capt. Patrick Hamilton bought two Deperdussin monoplanes, a 60-h.p. two-seater and a 28-h.p. single, and took them over to the United States to complete a tour of exhibition flying. After a period of successful flying at the Nassau Boulevard and other aerodromes, they went down South to fill an engagement in Mexico. Below Mr. Dyott relates some of his impressions of flying in that district].

Taking it on the whole, I did not find flying down in Central America anywhere nearly so comfortable as flying in the North. In all the hot countries in which I have flown, the calmest and most inspiring mornings, I soon learned were the most treacherous, and, in fact, almost dangerous. There might not be a breath of air stirring, yet the air would be riddled with heat eddies and down trends in every direction. Add to this a very hand a partly clouded afternoon was always bad, and the effect of passing from sunshine to shadow, or vice versa, was always accompanied by a sudden rise or fall of the machine. Another observation I made was that, while heat eddies would rise vertically in an absolute calm, a wind would incline them over at an angle, and under these conditions, flying with the wind, the disturbances would be more noticeable than flying

"And all the air a solemn stillness holds,
Save where the beetle wheels his droning flight."
Flying by moonlight in the tropics on a 60-h.p. Deperdussin.

gentle wind, and you have the only condition that could be worse, as this caused whirlwinds of a local character, which would swing even a moderately fast machine 30 or 40 degrees out of its course. Being caught in one of these whirlwinds I found the best way out was to dive the machine with motor stopped, at the same time turning head on to wind, if that were possible. A very curious condition of things existed in the Valley of Mexico. The valley is circular and surrounded on all sides by high mountains. At certain times during the day I found that I could make a complete circle one mile in diameter, having a following wind the whole way round. Up to 1,000 ft. the air would be steady, above that impossible.

Towards 4 p.m. on a cloudless day the heat eddies became less local in character, with the result that the entire atmosphere seemed to be rising. On the other against it. It seemed that the small local whirlwinds, dust devils as they were called, would originate about one of these air chimneys. One day I was flying near Puebla, 8,000 ft. above sea-level, with my 60-h.p. passenger-carrying Deperdussin. For several days I had been flying there, carrying passengers with success, when, about seven days after my arrival, I had an extraordinary experience. I had taken up a passenger, and after flying with him some 20 minutes, started to return to the aerodrome. Somehow the machine seemed to lose power, in spite of the fact that the speed indicator of my motor gave the proper number of revolutions per minute. A row of tall trees was between me and the aerodrome, and I was surprised to find myself almost, as I thought, on top of them. Naturally I elevated, but with no effect except the lowering of the tail. I cleared the trees by about 70 ft. or 80 ft., but at

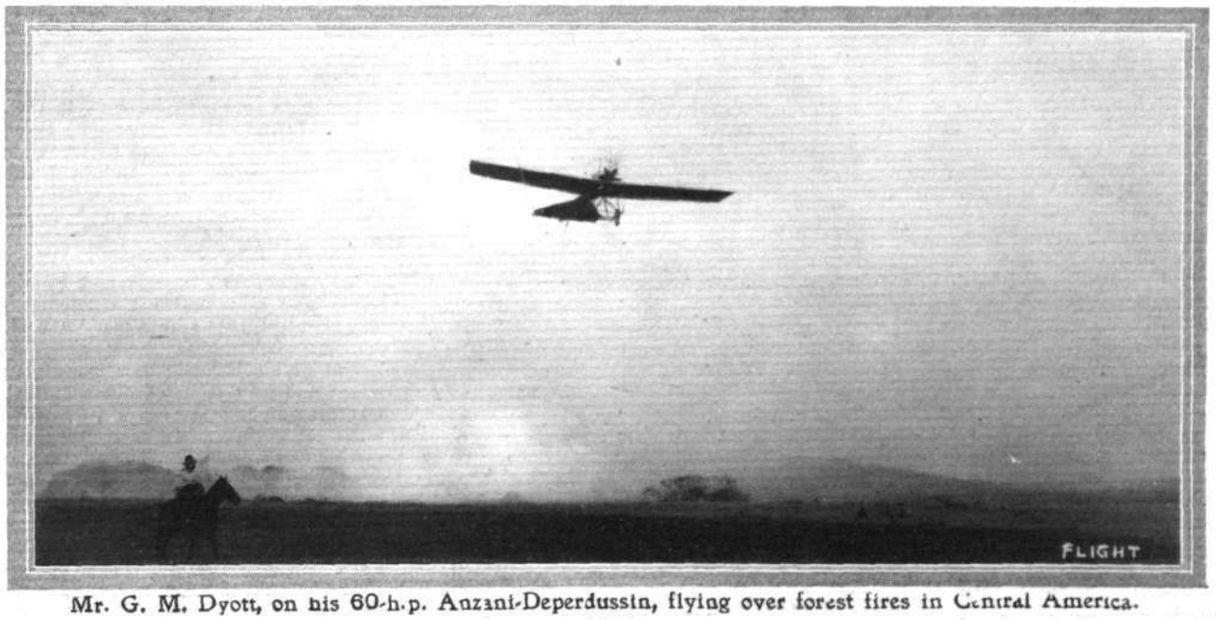
the same time a gust of wind caught me and the machine heeled over to one side. I warped immediately, but the warp seemed to have not the slightest effect. We got so far over that my passenger started to crawl up the higher wing. Then I nosed the machine downwards suddenly, a manœuvre which sent him flying back into his seat. Finally we landed safely.

This incident set me thinking, and I did not fly for a couple of days pending some explanation. What was wrong I could not conceive. The controls had not jammed, and I thought it impossible for a *remous* to have such an effect upon a machine in good flying condition. Here again the machine was apparently in good condition, for I had flown with her every day for a week, carrying passengers without the slightest trouble. The speed indicator was conclusive proof that the motor was not at fault; so what was wrong? After thinking the matter over for some time, the final analysis showed me that the only difference between this and my other flights was that it had been made after the sun had gone behind the mountains, a trifling difference to be sure, yet nevertheless the keynote of the whole situation. Subsequently I tried the machine in straight away flights with a passenger, when the sun was shining, when it was cloudy, and when it had sunk below the horizon. To my great satisfaction I found that in bright sunlight the machine would lift easily; but once let the sun get behind the clouds, passenger carrying was only carried out by working the machine above the safety limit.

Mr. G. M. Dyott explaining to President Madero of the Mexican Republic, how the controls of his monoplane work. Shortly afterwards the President went for a trip with Mr. Dyott, remaining up for about 16 mins.

Having determined this fact, the next thing was to experiment with the little three-cylinder Anzani Deperdussin single seater we had out there, which my friend, the late Capt. Hamilton, had not yet attempted to fly, owing to the aerodrome being so high above sea-level. Here the same phenomenon was apparent. The machine would not fly after 5 p.m. Unlike the two-seater it could fly in the morning when the heat eddies were still local in their effect, whereas the two-seater could not carry a passenger until the eddies had become uniform over the whole field.

To fly the small Deperdussin was a source of considerable interest. A run would be made over the ground, tail well in the air, making no attempt to get off. The first heat eddy encountered would lift the machine bodily off the ground like a balloon, some 30 or 40 feet. A slight effort would be made to check the rise until the disturbance had been passed through, then the elevator would be returned to a position of gentle descent, allowing the machine to gradually lose altitude until the next air "chimney" was encountered, when the same performance would be repeated. In this manner altitude could be gained according to the frequency of the heat eddies encountered, it being quite possible to get up to 1,000 ft. in 15 minutes. Towards three and four o'clock in the afternoon the periods of lift would *not* be as pronounced, as the whole atmosphere would then be rising. The minute the sun went behind the mountains flying was impossible unless the pilot weighed less than 130 lbs. Later observations showed that when the



Mr. G. M. Dyott, on his 60-h.p. Anzani-Deperdussin, flying over forest fires in Central America.

buzzards were soaring well up in the air the small machine would fly and the two-seater carry a passenger. If these birds were flying low and had to do much flapping, the air was only good enough for the two-seater to fly with the pilot alone. This point was soon to be brought home both to poor Capt. Hamilton and myself rather forcibly. We had been invited to pay a visit to the Country Club, some 16 miles from Mexico City. I suggested that we both go over on the two-seater, then, if we were detained till sunset I could fly back alone. Hamilton was rather anxious to put the little machine through its paces, and he decided to make the attempt on that, while I flew over alone on the two-seater. We set out at 2.30 p.m., the little Deperdussin climbing easily and well, and we both arrived safely. After a game of tennis, and some tea, it began to cloud over, and it was 5 before Hamilton started back. I rather urged him not to make the attempt, but he thought he could manage it, so off he went, disappearing over some high trees with 80 ft. or so to spare. He thought he could not clear them, and was trying to force the machine up, when a side gust caught him, turned the monoplane completely over, and it described a *vol plané* on its back, Hamilton with his knees under the control bridge, still hanging on inside. It landed, breaking everything but the wheels and Hamilton, who then dropped out unhurt—a marvellous escape.

It was an expensive break, but it served to confirm absolutely what we had already supposed, and we were obliged to chalk it up to experience, our fund of which was increasing much more rapidly than our banking account.

While speaking of heat eddies, I might mention an incident at Santa Rita, where I flew over a forest fire of considerable magnitude. Above the smoke region the hot air rose very rapidly, and as soon as the machine entered it, it would rise almost vertically. The first experience came so suddenly and with such alarming force that I felt sure something must have gone wrong, and I was not long in getting back to earth to think the matter over, a habit of mine. It was some time before I could persuade myself to try it again; however, when I did, the effect was the same, and once the cause of it was definitely determined it was rather a source of amusement to me and spectacular for the onlookers.

At this same place I had the disagreeable experience of being lost for an hour and a half. Outside of a few Indian huts and their occupants there was not a single soul within a radius of 30 miles. My mechanics and I ran the machines off two flat railway cars early that morning, and we spent a hard day erecting them in the hot sun. They were ready for action at four o'clock in the afternoon, and the machines were run out on to our improvised aerodrome, a patch some 900 ft. by 500 ft. which we had had burnt off and which was as black as a cinder. To be sure I could see it very plainly from above, so I took no particular care to take any bearings, but here I was mistaken as it turned out afterwards. I started off for the mountains and 15 minutes later by my clock swerved round and headed back again, but where was that little black patch of ground? Nowhere to be seen. Look as I would there was absolutely no trace of it. Imagine my feelings flying over a wild uninhabited country, tropical forests, jungles and swamps, everything but a good landing ground. The next thing I knew was the sight of the ocean looming up ahead of me, and as I knew I had started from a point about 50 miles inland, I turned back again and headed for Mount Orizaba. Back I went, making repeated *vol planés* to get a better look at the country below, my anxiety increasing at every revolution of the propeller. At last, in the gathering darkness, I caught sight of the flicker of a flame, and, making a beeline for it, found to my great satisfaction that it was our encampment. That night, as I lay awake under the wings of the good old Dep., I wondered what might have happened had I not caught sight of that flame. Once more I mentally chalked up a few figures to my fund of experience, reflecting that things as viewed from above do not necessarily appear as they do from the ground.

On one ground in Yucatan I could not fly unless at least 10 miles an hour of wind were blowing, as the field was too small to lift from without a head wind. Returning to earth was still more ticklish an operation, and I conceived the idea of spreading sand along the far end. It worked excellently, and pulled the two-seater up almost at once.

Flying out there late on in the day a curious feeling of drowsiness very often came over me. The peaceful surroundings, the dim light, the steady hum of the motor, and the uniform rush of the air seemed to induce a semi-hypnotic state which it was difficult to shake off. For this reason I never flew unless I was in good physical condition and had had plenty of rest.

⊛ ⊛ ⊛ ⊛

QUESTIONS IN PARLIAMENT.

ON the 8th inst., in the House of Commons, Lord C. Beresford asked the First Lord of the Admiralty whether he was aware that the Admiralty circular letter of July 15th, 1912, stated that officers and men of the Royal Flying Corps would be paid at certain rates, with additional flying pay of 8*s.* a day for officers and 2*s.* a day for men, and that in the circular letter it was laid down that these allowances would be paid continuously as in the submarine service, and that officers and men would receive only half the flying pay whilst under instruction and full allowance when qualified; whether the Admiralty have lately ordered that officers and men will only receive flying pay on days on which they actually make an ascent, half-rate whilst under instruction, and, presumably, though this point is not confirmed, the full rate when qualified; whether he is aware that it was under the former conditions that officers and men were induced to volunteer for the airship service, since no distinction was made between the airship section and the aeroplane section; and if he will state why the regulations in regard to the payment of flying pay to these officers and men were altered.

Mr. Churchill, in a written answer, stated: The answer to the first part of the question is in the affirmative; but the flying pay for men is 4*s.* or 2*s.* a day, according to their flying proficiency. As regards the second part of the question, the answer is in the affirmative so far as the naval airship section is concerned. With regard to the remainder of the question I have nothing to add to the reply given by Mr. Macnamara to Earl Winterton on the 1st inst. On the following day Mr. Joynson-Hicks asked the Secretary for War how many aeroplanes have been ordered of the eighteen for which tenders had been invited on December 19th, and why orders for further aeroplanes have been so much delayed. Colonel Seely replied that tenders have been received, the last on January 1st, and are under consideration.

Mr. Joynson-Hicks further asked the Secretary for War whether he is aware that over 400 aeroplanes were bought by the French Army during the past year in addition to the 218 possessed by the French Army at the end of 1911; how many aeroplanes the Royal Flying Corps possesses belonging to the Military Wing, and how many at the Central Flying School; how many of these are actually in flying order; and how many of them are capable of exceeding a speed of 65 miles an hour in calm air, *i.e.*, without the assistance of the wind.

Colonel Seely in a written answer stated: There is no information at the War Office to show the number of aeroplanes bought by the French Army during the past year. The Royal Flying Corps, Military Wing, possesses 29 aeroplanes, and the Central Flying School 26. Of these, 26 and 19 respectively are in flying order. With regard to the last part of the question, I do not think it is desirable to make public the qualities in speed or otherwise of our aeroplanes for use in war.

FLIGHT

SOME THOUGHTS ON STABILITY AND CONTROL.

By A. E. BERRIMAN.

(*Continued from page* 37.)

II. The influence of direction on power of recovery. Still air stability and virtual firs.

Reverting to the general problem presented by positive wing tips, the study thereof is obviously incomplete without reference to their power of recovering balance by oblique movements, which is, in part, the basis of the security of the modern positive wing-tip machine.

A machine of this class, it has already been argued, will not continue to steer a safe circular course with fixed controls. Consequently, if it be assumed that the system is nevertheless inherently secure, such security must lie in the quality of automatic recovery of balance, and its existence must depend on the inherent tendency of the system to maintain a straight line flight.

We are thus brought back to a realisation of the intimate connection between directional and lateral stability in a laterally unstable system, and to the fundamental necessity of considering the problem of balance from the point of view of steering control.

Directional stability, it has been made clear in the first part of this article, is related to the spin of the machine about its vertical axis, rather than to its course in the air. Thus, the term weathercock directional stability has been applied to the quality of freedom to spin in sympathy with the veering or the backing of the wind, just as a weathercock spins on its pivot when the air in its vicinity changes its direction of flow.

If the wind-vane were jammed, it would exhibit directional stability in another sense. Directional stability of this kind is also displayed by the axis of a gyroscope and the needle of a compass. The latter suggests the phrase "compass directional stability" as suitable to be applied to a system that exhibits no tendency to spin in sympathy with a veering wind.

A veering wind, it has been argued, is in itself a relative spin, and, as such, produces a virtual acceleration of one wing-tip accompanied by a virtual retardation of the other. The problem of absolute lateral stability thus, in principle, resolves itself into eliminating the tendency to cant under these conditions.

It has been explained that negative wing tips potentially satisfy the above requirements. Positive lift wing tips, on the contrary, do cant in a relative spin of the wind, and are, therefore, liable to have their lateral balance disturbed under the conditions of practical flight.

Positive lift wing tips are thus inherently unstable, but if the system to which they belong possessed such sensitive weathercock directional stability as to prevent a relative spin of the wind by causing the wings to pivot on their vertical axis in complete harmony with a veering or a backing wind, the cause tending to make them lose balance would be neutralised.

This latter alternative having been dismissed as impracticable, renders it necessary to assume that any inherent security in a system possessing positive wing tips must of necessity be confined to the quality of automatic recovery of lateral balance, which quality, it has been explained above, must in turn be accompanied by a tendency on the part of the machine to avoid a circular course.

In fine, if the machine with positive wing tips is to display the quality of automatic recovery of its lateral balance when disturbed, it must possess inherent "compass" directional stability.

Weathercock directional stability implies that the tail of the machine swings to leeward when the wind changes, the axis of the machine remaining always in line with the relative wind. On the contrary, compass directional stability implies that the head and the tail of the machine slide to leeward together when the wind changes.

Owing to the inertia of the mass of the machine, a time interval is involved in acquiring this leeward motion. The real wind changes with great rapidity, but the machine as a whole is less mobile. It is even less mobile as a whole than it is as a system revolving about its vertical axis, for if it be assumed that the wind changes with the same rapidity in both cases, then the acceleration required of the entire mass in the one case is that required principally of the tail portion in the other case.

When the system has accelerated to leeward and has thereby acquired the speed of the lateral component of the real wind, then the only relative wind remaining will have become longitudinal once more.

Thus, but for the fact of the inertia above mentioned, the machine would slide laterally with the acceleration of the lateral component of the wind. In such a case, which is, of course, impracticable, compass directional stability would be equivalent to weathercock directional stability in so far as it conferred lateral stability by eliminating the lateral component of the wind.

In the above case of sensitive weathercock stability, the spin of the machine is supposed to harmonise with the angular velocity of the wind; under the other hypothesis the two rectangular components of the wind are supposed to be dealt with separately.

Neither case is feasible in a real aeroplane, but it is important to note that there is a general tendency towards directional stability of the weathercock order in any machine with positive symmetrical wing tips.

On the general principle of the balance of power to the two wings, it is apparent that neither will tend to accelerate in its own level of its own accord. Conversely, if the conditions of relative acceleration is imposed by a veering wind, the balance of power will tend to engender spin about the vertical axis in sympathy with the wind, if canting is prevented.

Inertia to rotation will prevent the spin of the machine being as quick as the angular acceleration of the wind, and for this reason inherent lateral stability demands as a primary feature of the system that it should not cant while this relative spin of the wind continues.

As there is undoubtedly a canting couple induced on positive wing tips by a relative spin of the wind, it is in negative wing tips, which are not thus affected, that I see at present the only plausible solution to inherent absolute lateral stability.

A simple practical test for the possession of that quality is, I have suggested, the ability to fly a complete circular course with fixed controls.

Even with inherent lateral stability there still remains the fundamental necessity for high reserve power, in order to avoid descent when turning. Among other things, the above reasoning thus leads me to the thought that the really successful aeroplane of the future will be somewhat like the modern motor car of to-day in respect to its engine being considerably larger than is needed for ordinary flight.

Whereas the automobile of the road uses its reserve power for ascending hills at a good rate of speed, however, the voiture of the air will apply it for negotiating turns and for combating high winds in order to prevent leeward drift.

In this latter respect high power must ever be a limit to the capacity of the aircraft to keep its course, and inasmuch as leeward drift may involve the alternative of a dangerous landing or being blown out to sea, so will high power become, as I said in the first instance, a primary "factor of safety" in flying.

Diagrams published in Part I of this article showed the relationship of the bank and the turning force. For a bank of 45 degrees, for instance, the centripetal force is equal to the weight supported against gravity. The radius of a given bank increases as the square of the speed needed for the support of the load due to the centrifugal force and the weight, which speed, other things being equal, depends on the wing loading.

Thus, if a bank of 45 degrees is completely supported at 80 ft. per second, the radius of the turning circle is 200 ft.; if a lower loading permitted the same bank to be maintained at 60 ft. per second the radius would be reduced to about 112 ft.

Alternatively, if the speed on the turn is very much above the normal it may suffice to support a very steep bank at a small radius. The question of a small turning circle, therefore, depends on the reserve power that can be converted into extra speed for the purpose of generating extra wing pressure. Other things being equal, the lower speed machine will manœuvre in the least radius and will be able to put about in the least time.

Before proceeding to discuss the possible ability of positive wing tips to recover their lateral balance after being disturbed, let us consider for a moment the drift effect of a veering wind.

Symmetrical positive wings, it has been pointed out above, tend to spin while the wind is in angular acceleration; the machine as a whole likewise tends to drift or slide to leeward.

When the angular acceleration of the wind ceases, the tendency to spin ceases also. Similarly, the acceleration of the lateral drift on the machine as a whole remains until it has acquired a sideways slide equal in velocity to the lateral component of the wind.

Actually, these two accelerations of spin and lateral drift commence simultaneously. If the inertia to spin is proportionately small, the spin will be relatively great. On the other hand, if the system has much vertical surface, it is likely to accelerate quickly to leeward, thus reducing the tendency to spin.

In a system such as an aeroplane, the significance of the spin lies in its influence on the direction of the propeller thrust. The propeller being axial, the line of its thrust is turned more against the wind by weathercock directional stability, and so the lateral drift component of the wind is thereby opposed.

With sensitive weathercock directional stability, the lateral drift would be eliminated, but the existence of absolute sensitiveness

implies a machine without inertia, and, therefore, without mass, which is impossible.

It should be noted that the gyroscopic effect of the propeller tends to affect weathercock directional stability and also to react on the longitudinal stability.

Alternatively, if there is no spin, then the leeward slip of the machine ultimately acquires the velocity of the real wind.

When some spin accompanies the drift, equilibrium is established when the flow of the relative wind is once more axial.

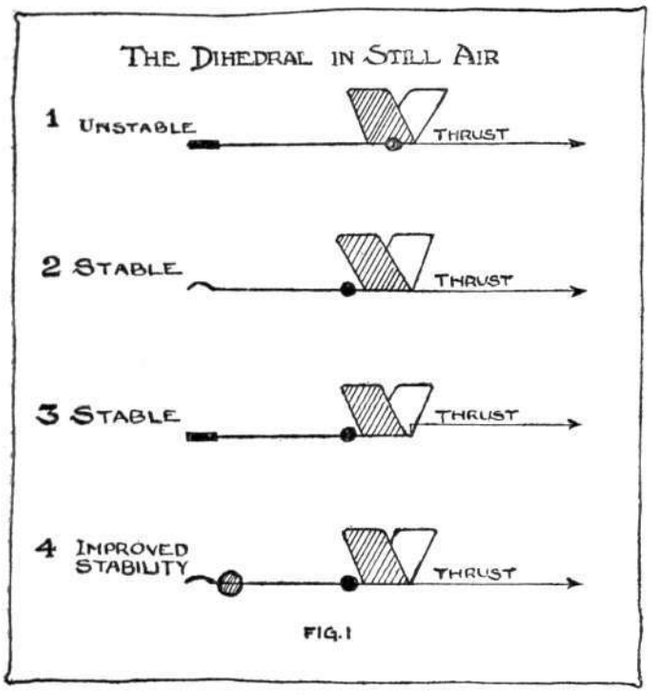


FIG. 1

In any case, equilibrium demands an axial flow of the relative wind, for while the flow is oblique there is a component of lateral drift, inducing acceleration to leeward. Moreover while there is lateral acceleration of the system, there is a virtual relative spin about its vertical axis, and the appropriate consequences will follow.

In a system having compass directional stability, the ultimate leeward drift velocity is that of the lateral component of the wind. In the presence of real winds, therefore, the natural undirected course of such a machine is liable to be very wide of the mark. Even if the principle confers the power of recovering equilibrium after disturbances during the windy periods, there thus still remains the necessity of steering a curved course in a calm and the instability of positive wing tips in that manœuvre have already served as subject matter for the preceding article.

It now remains, therefore, to consider what power of inherent recovery of balance may be possessed by wings with positive tips, if the system to which they belong likewise possesses compass directional stability.

In this connection it is interesting to recall the elementary experiment of the ballasted flat plate. A small sheet of mica, or stiff note paper, suitably loaded on its leading edge with a split shot, a drop of sealing wax, or the like, will maintain its balance when gliding in still air. This it does by virtue of symmetry of form, its "compass" directional stability and its longitudinal "weathercock" stability.

If canted, it immediately proceeds in an oblique direction, its longitudinal axis remaining parallel with its original position. There is a sideways component to this motion, and in the sideways component lies the reason for the recovery of lateral balance, which ensues after the model has flown a little way on its oblique path.

Considering the sideways motion separately, the plate represents an inclined plane in respect thereto, and as it is well known from experimental evidence that the centre of pressure on such a system is nearer the leading edge than the trailing edge, it follows that the leading edge will tend to rise, for the c.g. is central. The leading edge in respect to the sideways motion is the lower wing tip of the canted plate. Equilibrium is thus automatically restored by the sideways motion so long as the compass directional stability is maintained.

If the flat plate were fitted with a vertical tail fin, such as a neutral rudder, and were thereby possessed of inherent weathercock directional stability, it would capsize instead of righting itself.

When canted, it would begin to move sideways, as before, but its longitudinal axis would swing in harmony with the obliquity of its motion, which would accelerate the relative velocity of the higher wing and so augment the cant. The effect being cumulative, the system would thus ultimately capsize in a spiral *vol piqué* or sideslip.

By the same reasoning, a vertical fin *in front* of the c.g. to neutralise the effect of a vertical tail fin, naturally suggests itself as a means of obtaining "compass" directional stability.

Also, a fin *above* the c.g. seems reasonable as a means of enhancing the rapidity of recovery from the disturbance.

It is equally conceivable that the effect of these three fins could be secured by two fins of appropriate area and position. Or, that "projected" areas of the whole or portions of the wings might be regarded as virtually fins, and so serve the purpose of such.

From the work of Prof. Bryan, who has investigated this aspect of the subject mathematically, it appears that the combination of a vertical tail fin (situated more or less in the position ordinarily occupied by a rudder) with a vertical fin in a rather elevated position, and in front of the c.g. (Fig. 2D), is likely to give the best results. These two fins, if properly arranged, confer the power of automatic recovery of lateral balance, and they maintain the compass directional stability of the system.

It would seem from Mr. E. H. Harper's remarks at the Aeronautical Society recently, that the elevated fin in a forward position can be virtually created by the use of up-turned wing tips suitably arranged.

Wings set at a dihedral angle to each other are also, by the same reasoning, equivalent to the combination of level wings with a vertical fin above the shoulder. In order, however, that the system should be stable, it is necessary that the c.g. of the system should be behind the wings. When thus situated, the virtual fin represented by the dihedral is again placed in an elevated forward position.

The accompanying set of diagrams (Fig. 1), showing the dihedral in still air, are based on remarks contained in Mr. E. H. Harper's recent paper before the Aeronautical Society, and they sum up, I believe, the situation there presented of the dihedral in still air.

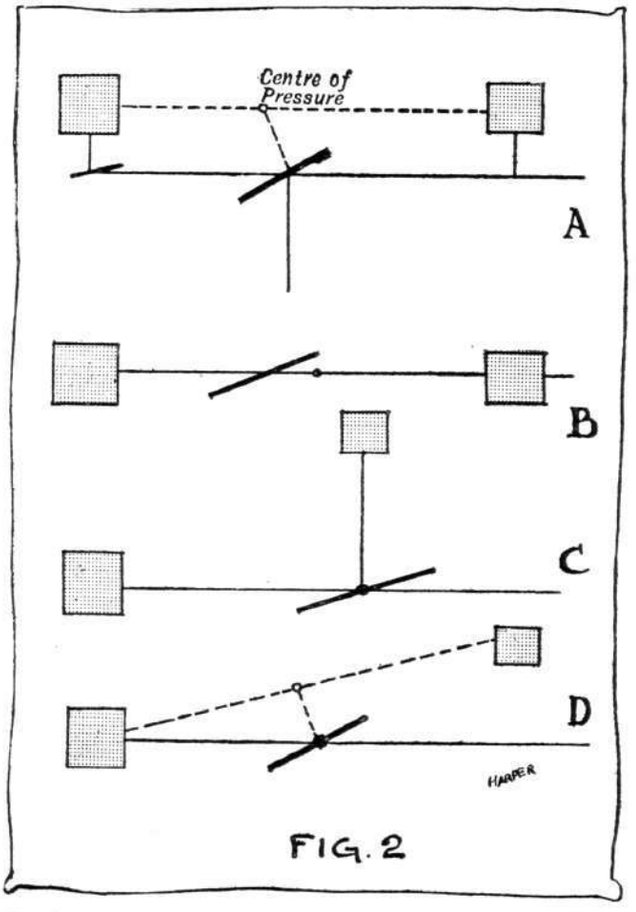


FIG. 2

It will be observed that Diagrams 2 and 3 show stable conditions without a tail fin. This is due to the fact that there is a particular region above the c.g. in which a single fin has some stabilising value. It implies, of course, the absence of any weathercock directional stability in the tail.

Another set of diagrams (Fig. 2) reproduced from Mr. E. H. Harper's paper, and originally published, with the exception of D, in Prof. Bryan's Book on Stability, shows various combinations of fins that have been investigated.

While the presence of a fin can be shown to confer the power of automatic recovery of balance in still air, it is apparent that the fin itself is a target for a gust of real wind. If, therefore, while flying the relative wind veers or backs there will be a greater force causing the machine to cant.

Again, bearing in mind the significance of compass directional stability on the power of recovery of balance, it is apparent that on a machine with a tendency to weathercock directional stability, the pilot may have to rudder outwards in order to avoid a spin that otherwise might culminate in a nose dive.

Ruddering inwards when overbanked, appears to me to be in any circumstances, a serious error in control. Ruddering outwards and increasing the angle of the lower wing by the warp appears to me to be the proper combination for enhancing the quickness of recovery on modern machines. Other considerations in practical flight that I have not taken into account, may, perhaps, vitiate this argument, which is, of course, presented with all deference to the judgment of pilots.

Thus, the argument proceeds in a circle around the fundamental instability of the positive wing tips.

Wings with positive tips are laterally stable if spin is prevented. Fore and aft fins will prevent the system spinning in a calm, but they will neither prevent nor neutralise the relative spin of a veering wind. Wings with positive tips are thus necessarily liable to be canted, but they may equally have the power of recovering their balance. Even this, however, still leaves them with the fundamental objection of being unsuited for steering purposes.

In the apparent fact that a gust is a phenomenon of very brief duration in itself, lies, I think, the essence of the quick recovery of a well-designed modern machine, which is another reason why the problem seems to me to be wrapped up in the steering control.

The characteristics of different positive wing tip systems might, owing to the variety of fin combinations that is possible, be expected to show marked differences of behaviour in the air. There is, for example, the relative steadiness and the damping effect of the wings to be considered: the more lightly loaded and faster machines being potentially the steadier in their flight.

Again, those in which compass directional stability has been made a predominant feature of design by the use of up-turned wing tips to project a forward fin, would be likely to slide bodily sideways at slow speeds in windy weather, and to roll with a slow period as compared with machines that have a higher fin not so far forward of the c.g. as with dihedral wings.

Yet another important factor is the influence of automatic warping, some wings being so constructed that they tend to warp automatically in very windy weather and thus conceivably may "spill" the gust. This may be provided for with wings that have in themselves a rigid construction; there are, however, also examples of machines having flexible wings that would presumably act in a similar manner.

According to individual tastes so I imagine could a machine be designed with characteristics to suit. But, so far as I can see, it is impossible for it to possess absolute lateral stability under the practical conditions of flight unless it has negative wing tips.

(*To be continued.*)

THE COLLAPSE OF MONOPLANE WINGS.

By L. HOWARD-FLANDERS.

IN his article in last week's FLIGHT, Mr. Griffith Brewer draws attention to conditions that he believes may be a source of danger to monoplanes, and asks that his remarks should be discussed. As I differ from his conclusions, I will, therefore, set out the contrary argument.

In the first place, as Mr. Griffith Brewer referred to Blériot wings in his article, I will refer to Eiffel's *aile* No. 13 *bis*:—

"Without changing the path of flight of the machine the speed of travel may increase, and this causes the centre of pressure to travel backwards, thus tending to turn the wings over forwards, &c. &c."

Firstly, without changing the attitude of the machine to its flight path, it is impossible to increase the speed. A pilot on a machine properly equipped with instruments, can see on his instruments both the air speed of his machine and its attitude to the horizon. He can cause the machine to fly within the limits considered safe by the designer.

In Eiffel, the exact position of the c.p. of the plane for all angles is clearly set out, hence by simple arithmetic it is possible to discover the correct position and strength of the rear spar and main spar. Hence, why should there be any tendency to twist the plane? It is customary to brace the rear spar as well as the main spar, and to allow for all movements of the c.p.

In fact, it is not clear what is meant by this "twisting." If self warping is meant, it is as well to remember, when considering self warping, that as one plane decreases in angle the other plane increases in angle, and it is in no way caused by effective position of the c.p. of the machine as a whole.

The angle of no lift ("critical angle" [*sic*]) for 13 *bis* is about -3°, as the angle of the plane is altered either positive or negative from this angle there is no sudden increase of lift (or depression) as the increase of lift curve in this region is approximately a straight line. Hence there can be no "flip over" at this point. Further, it is possible and usual to brace an aeroplane with suitable materials and in such a manner that there is no slack in the bracing at any time.

In his article Mr. Brewer says, "a quick downward angular movement of the ends of the wings takes place, the upper stays then receive the strain of the slack being taken up," &c.

I ask, however, why have any slack in the upper bracing wires? It is surely a sign of careless fitting. Again, if Mr. Griffith Brewer will take the trouble accurately to follow the flight path of a monoplane while performing this evolution and make a few accurate calculations he will be unable to prove this mysterious top pressure. I do not attempt to disprove the possibility of top pressure, but it is obvious that top pressure cannot be produced by the cause mentioned.

If Mr. Griffith Brewer wishes to make a practical experiment on the question of top pressure, let him try this simple experiment: Place a stone in the passenger's seat (or other spot on the aeroplane at or near the c.p.), then if the machine is flown in such a manner that top pressure occurs, the pilot will see the stone leaves the seat. Relative to the aeroplane, it will appear to be thrown upwards into the air, as when top pressure occurs the aeroplane will be falling faster than the stone. On the same argument, the pilot should wear a safety belt.

Furthermore, a simple air-speed indicator may be fitted to the aeroplane showing the relative air velocity of the planes, this will soon give figures from which the position of the c.p. may be discovered. It will be found that the movement shown on the air speed indicator is not great even in considerable winds.

I will now quote Mr. Griffith Brewer in respect to biplanes *v.* monoplanes: "The truss systems of the biplane structures make the wings equally strong in both directions, so that this collapse danger is entirely absent." If Mr. Griffith Brewer will inspect the wings of several famous makes of biplanes in which the wings are warped, he will find that the angle of the bracing to the rear spar is worse than in many monoplanes. Further, it is usual when designing monoplanes to calculate the stresses for all positions of the c.p., taking the maximum possible lift at the various angles, also to make due provision for top pressure.

Further, considering the much-vaunted superiority of the biplane as regards stresses. If steps be taken to design a monoplane and a biplane of equal weight, speed, gliding angle, and efficiency, it will be found in fast, efficient machines having a fine gliding angle, that the sum of the stresses in top and bottom spars of the biplane are at least as high as $\frac{3}{4}$ of the stress in the spar of the monoplane. It is preferable when using timber for construction to employ one large piece of wood instead of two smaller pieces. This is due to drying out and becoming short. Moreover, two spars do not increase the safety, as the failure of either one of them is as bad as the failure of the single monoplane spar. Furthermore the low loading usually employed on a biplane allows of much greater overloads, and hence necessitates a considerably higher factor of safety.

Aviation at Birmingham.

OWING to the snowstorm which prevailed all day last Saturday, the proposed flight by Mr. Hamel on the Birmingham Aero Club's aerodrome had to be abandoned. The club, however, is by no means disheartened by this set back, but will endeavour in the near future to arrange for a series of exhibitions by Mr. Hamel extended over three or more weeks.

In the meantime there will be plenty of interest on the aerodrome at Billesley with the experiments of the full-sized glider and the construction of a full-sized aeroplane which will shortly be started.

NEGATIVE WING TIPS AND LATERAL STABILITY.

By J. H. HUME-ROTHERY, M.A., B.Sc.

The following article reached these offices after the printing of Mr. Berriman's article in last week's issue of FLIGHT, *but before the Journal was in the hands of the public. It is an entirely independent treatment of the subject, and it arrives at the same conclusion as to the stability of negative wing tips. The method is of still further interest and importance, in that it provides a quantitative analysis, while as a line of thought it serves as a direct link with Prof. Bryan's mathematical treatise, a synopsis of which was recently presented as a paper to the Aeronautical Society by Mr. E. H. Harper, and will be published in* FLIGHT *shortly.*—ED.

IN a few types of aeroplanes—notably the Dunne—the tips of the wings are inclined at a negative angle, *i.e.*, down in front, and the exact effect of this on stability when carried out in such a way as to produce a downward pressure on the tips, is a very interesting problem.

From the practical point of view the word stability has a wider meaning than its strictly mathematical definition. Strictly speaking an aeroplane is stable, if when slightly disturbed out of its normal flying attitude by some force it tends of itself to return to the proper position. But practically of equal, if not of greater, importance is the question as to whether there is to be any disturbing force, in other words whether gusts will twist it about. And so long as no gust can produce any great disturbing force, a very slight degree of true stability will suffice, for the pilot's control can be operated to bring the aeroplane back to its position.

In most cases, unfortunately, any device that improves the stability of the aeroplane renders it more subject to disturbance by gusts, and the special interest of the negative wing tips is that it seems possible to prove that they can improve the true lateral (or asymmetric) stability while reducing the effect of gusts.

In dealing with gusts, they may be classified into horizontal and non-horizontal; also into full gusts, which strike the whole machine nearly simultaneously, and partial gusts, which act on one part of the aeroplane for a considerable time, or act much more strongly on one part than another.

Full gusts do not greatly affect modern aeroplanes, at any rate in regard to lateral stability. As long as the lateral centre of pressure is but little above the centre of gravity, and neither in front nor behind it, no serious heeling or turning should be caused. But a partial gust striking one extremity causes serious displacement.

Whether any device could prevent a partial non-horizontal gust from blowing a wing tip or tail up or down is doubtful, but the

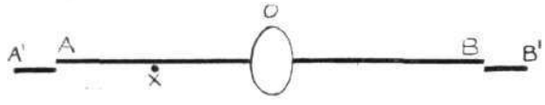


Fig. 1.

following considerations seem to prove that negative wing tips may prevent any partial *horizontal* gust from heeling the aeroplane over to one side. Suppose a partial head gust strikes the aeroplane AOB (Fig. 1), so that it is stronger on the wing AO than on BO this will make the lift on AO the greater, and so cause it to rise and B to fall. If AA^1 and BB^1 be negative wing tips then the gust will increase the downward force on AA^1 more than BB^1, causing a counteracting couple. Since the tips are a long way from O their leverage is great, and this counteracting couple may be sufficient to neutralize the upsetting couple.

For the purpose of calculation, we may reasonably assume the strength of the gust to increase regularly from B^1 to A^1, so that the relative velocity of the air at any point x will be $V + ax$, thus varying from $V - al$ at B (if $OB = OA = l$) to $V + al$ at A. The upsetting couple will then be (assuming the wings do not taper)

$$= K\int_{-l}^{+l}(V + ax)^2\, x\,dx = K\frac{4}{3}\,Va\,l^3$$

and the counteracting couple due to the tips

$$= K\frac{4}{3}\,Va\,(l^{13} - l^3), \text{ if } OA^1 = l^1.$$

For these to balance $l^3 = l^{13} - l^3$ or $l^1 = 1{\cdot}27\,l$ roughly, or AA^1 must be about one-quarter of OA. If the wings were tapered, less area of negative tip would suffice.

If instead of the negative tips being continuous with the wings they were joined to it by light spars (Fig. 2), a smaller area would suffice on account of the greater leverage. For instance, if the wings were 15 ft. long and the spars projected 3 ft., calculation shows that 3 ft. of negative tip would suffice.

But in practice much less would be needed on account of the self-warping of the wings, which reduces the upsetting couple greatly, and hence the righting couple may be much less than that shown by the above calculation. So that smaller negative tips quite within the limits of practical construction would be sufficient.

Such tips would have a further effect: in turning, the machine would have no tendency to bank itself. For in turning, the relative velocity of the air increases from the wing tip on the inside of the curve to that on the outside, in just the same way as we assumed when dealing with the partial head gust. Now banking is necessary for turning, but as pilots have at present to use the warp to prevent overbanking during a turn, there seems no reason against their having instead to use it to *produce* sufficient banking. It would be different from the present practice, but that in itself is no real practical objection.

For it has this advantage: while a full gust from the side will not cause the aeroplane to turn if the centre of lateral pressure coincides with the centre of gravity, a partial side gust that strikes only the nose or tail will unavoidably do so, and this sudden turn will cause an ordinary aeroplane to heel over. But if provided with negative tips the sudden turn will not cause any heeling.

Negative wing tips, therefore, should prevent any partial horizontal gust (whether coming ahead or astern or sideways) from heeling the aeroplane over sideways.

Whether by having the negative tips attached to the two main wing spars (as shown in Fig. 2), so that when the wing warps upwards the negative tips dip down in front, whether this would lessen the effect of a partial non-horizontal head gust might be worth considering, but it is outside the scope of this article.

So far we have considered the negative tips as lessening the effects of partial gusts, it is now time to turn to their effect on the strict (or mathematical) stability. Prof. Bryan's book, "Stability in Aviation," gives the method of investigation. On p. 32 he gives certain functions denoted by the German letters $\mathfrak{A}$, $\mathfrak{B}$, $\mathfrak{C}$, $\mathfrak{D}$, and $\mathfrak{E}$, all of which must be $+ ve$ for lateral stability, as well as the function $\mathfrak{BCD} - \mathfrak{AD}^2 - \mathfrak{B}^2\mathfrak{E}$ which he calls $\mathfrak{H}$. On p. 126 he shows that this is impossible with simple straight wings, even (p. 128) when

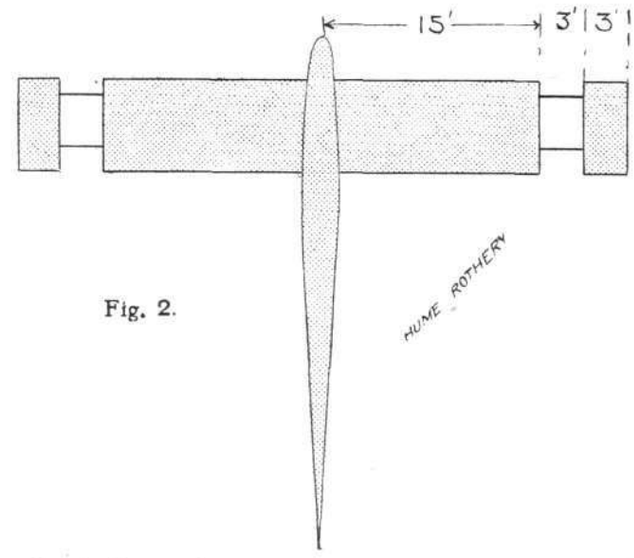


Fig. 2.

combined with a vertical keel plane or fin, which one may consider as representing the lateral surface of an aeroplane.

Now the special interest of the negative tips is that on introducing the terms representing their effect, I have discovered that the above conditions of stability can be easily satisfied. The essence of the effect of the negative tips is that they render the motions of heeling and turning quite independent of each other, and this removes many of the $-$ terms from the above functions, so that they can easily be rendered $+ ve$. In Prof. Bryan's language the resistance derivatives L_q and M_p may both be made.

To fully set out this investigation would be too lengthy for this article, but the following summary will enable anyone conversant with Prof. Bryan's book to follow it and check the results.

By having the negative tips so that the moment of inertia of their area with respect to the plane of xy equals that of the main planes (I), but set at a negative angle $-\alpha$ equal to the positive angle α of the main planes his formulæ (137) on p. 126 become:—

$$L_p = 2\,KUI\cos^2\alpha \qquad L_q = 0$$
$$M_p = 0 \qquad M_q = 4\,KUI\sin^2\alpha$$

Assuming that the centre of lateral pressure of the vertical fin (for grazing incidence) is neither before no behind the centre of gravity,

so that x (on p. 128) = 0, the complete set of resistance derivatives becomes:

$$Z_w = KTU \quad . \quad Z_p = KTUy \quad . \quad Z_q = 0$$
$$L_w = KTUy \quad . \quad L_p = KU(2I\cos^2\alpha + Ty^2) \quad . \quad L_q = 0$$
$$M_w = 0 \quad . \quad M_p = 0 \quad . \quad M_q = 4KUI\sin^2\alpha$$

if we assume K to have the same value for planes and fin as suggested by Professor Bryan on p. 130. Assuming also as he does that the product of inertia $F = 0$, the complete set of functions becomes:

$$\mathfrak{A} = WAB$$
$$\frac{\mathfrak{B}}{g} = KU\{ABT + W(4AI\sin^2\alpha + B(2I\cos^2\alpha + Ty^2))\}$$
$$\frac{\mathfrak{C}}{g^2} = K^2U^2\{4ATI\sin^2\alpha + 2BTI\cos^2\alpha + 4WI\sin^2\alpha(2I\cos^2\alpha + Ty^2)\}$$
$$\frac{\mathfrak{D}}{g^3} = 8K^3U^3T^2\sin^2\alpha\cos^2\alpha - \frac{W}{g}BKUTy\cos\theta_0$$
$$\frac{\mathfrak{E}}{g^4} = -4\frac{W}{g}K^2U^2TIy\sin^2\alpha\cos\theta_0$$

As long as y is $-^{ve}$, that is the centre of lateral pressure is above the centre of gravity these are all $+^{ve}$ as is needed for stability. But in practice y must be very small to prevent heeling over to a full side gust. If $y = 0$ then $\mathfrak{E}$ would = 0, and the aeroplane would cease to be stable, but apparently not dangerously so, since it would only indicate a condition of neutral equilibrium, *i.e.*, no tendency to recover itself, but also none to upset further, that is as long as the further condition $\mathfrak{D} + ^{ve}$ holds. Putting $y = 0$ in the above functions, $\mathfrak{D}$ comes out so thoroughly $+^{ve}$, that as there is no sign of a discontinuity one can be satisfied that it will also be $+^{ve}$ for a *small* negative value of y. Further calculation indicates that it will be $+^{ve}$ at least as long as $y < \frac{2Ig(AT + 2WI\cos^2\alpha)}{AU^2S^2\sin^2\alpha}$ and probably further and stability is assured.

Without the negative tips it is impossible to obtain stability with a single vertical fin, as Prof. Bryan states clearly on p. 128. He shows later, on p. 137 how stability may be obtained by two fins, and the addition of negative tips in such a case would still further increase the stability.

To conclude: negative tips should render an aeroplane immune, as far as lateral balance is concerned, to the effects of all partial horizontal gusts, while at the same time they should greatly improve the lateral stability, using the word in its strict sense. In the Dunne machine, the negative tips being at the ends of bent back wings, have doubtless some effect also on longitudinal stability, but this investigation shows they should have a very good effect if placed at the ends of ordinary wings. To fit a couple of light spars (say steel tubes) into the ends of the main spars of the wings, and attach negative tips, ought to present no difficulty, and would be well worth trying. Their precise size would be a matter of experiment, the correct size being obtained when the aeroplane showed no tendency to bank itself on putting over the rudder and leaving the warp loose. For safety it would be well to start with tips of a small area—say 2 or 3 square feet—that would produce a less effect than this, in case any unforeseen bad result should show itself, and then increase them to the proper size if the small ones proved harmless. It should be noted that the downward pressure of the tips would somewhat lessen the strain on the lift wires.

THE THAMES DISASTER.

THE Thames, in the neighbourhood of Erith, was, on Monday last, the 13th inst., the scene of a double aviation fatality. Shortly after half-past three in the afternoon, Leslie F. Macdonald, flying a 70-h.p. Gnome-engined Vickers tractor biplane, with Harold England, a mechanic, as passenger, had, by reason of engine trouble, to descend on to the river. Both men were unhappily drowned.

The machine on which the accident occurred was a tractor biplane of a new type, on which Macdonald had been flying at Erith for the past two or three weeks. They had started out from the private flying grounds adjacent to the Erith works of Messrs. Vickers, Ltd., for the purpose of carrying out a practice flight. It appears that the machine rose, keeping very low, and headed for the opposite bank of the river. Before it reached the opposite shore, however, it was seen to descend suddenly upon the water. Two minutes elapsed before the machine sank, and during that time it was observed through a telescope that one of the occupants, probably England, the passenger, had got free from the cockpit and had succeeded in getting on to the upper plane of the machine. Shortly afterwards the machine sank, and he struck out for the Kent shore, from which two boats had put off to his assistance. Unfortunately, before they could reach him, in fact, even before he could swim a dozen yards, he disappeared. The other occupant of the machine, apparently made no attempt to extricate himself, and so sank with it. In starting away they had both strapped themselves in with safety belts, which were both provided with quick release fastenings. The River Police and a party of men from the training ship "Worcester" were soon upon the scene of the accident, but although they have conducted an arduous search, dragging the river bed in the neighbourhood, they have not, up till the time of writing, succeeded in finding the bodies of the unfortunate men, or in locating the position of the sunken biplane.

As for the cause of the accident, Capt. H. F. Wood, manager of the Aviation Department of Messrs. Vickers, Ltd., holds the theory that the catastrophe may be directly attributable to a badly running engine. It has been ascertained that at the time Macdonald left the ground at Erith the engine was misfiring, although perhaps the trouble, at that time, might have been so slight that it gave the pilot cause to think that the engine, after running a little while, would pick up its normal number of revolutions. From the reports of eye-witnesses, working men for the most part, but who are nevertheless used to seeing machines in the air, it has been learnt that the biplane was travelling at a much less speed than its normal flying speed of 60 miles per hour. Furthermore, some of those who watched the machine have said that instead of the propeller running smoothly, it appeared to flicker, a point which in itself points to the fact that the engine was running far from satisfactorily. At the time when the machine commenced its flight over the river, it had only attained an altitude of 40 to 80 ft. The pilot continued on, it is thought, in the hope that his engine would pick up. He could hardly have done otherwise, for, with such a poorly running engine, and having such little altitude, it would have been unsafe to attempt a sharp turn in order to get back to his starting point. As the engine showed no signs of regaining its normal number of revolutions, the pilot had three courses open to him. He could have landed on the opposite bank, he could have made a very gradual turn and so got back to his starting point, or he could have come down in the river. The opposite bank was steep and unsuitable as a landing ground, and as Macdonald had often told Capt. Wood that should he at any time become forced to descend he would prefer to land in the river than to land on any ground the surface of which he was not acquainted with, it is conceivable, therefore, that he intentionally brought the machine down on to the water. On the other hand it may be that the engine power fell off so rapidly that the pilot could not prevent the machine dropping. This latter theory is rather supported by the fact that the engine was running when the machine dropped into the water. Had the pilot intended to come down in the river, he would most probably have switched off and allowed the machine to "pancake."

Such is, at any rate, the cause assigned to the fatality formulated from the evidence that is available at the present time. For the rest, we must await the findings of the Accidents Committee of the Royal Aero Club, whose self-imposed duty it is to examine all evidence relating to serious accidents, and to publish recommendations which will assist in preventing recurrences of a similar nature.

Leslie F. Macdonald, although only 22 years of age, was one of our earliest pilots. He obtained his certificate, numbered 28, on a Bristol biplane, at Brooklands on November 15th, 1910. It is a noticeable point, since more certificates have been won on Bristol machines than any other make of aeroplane in Great Britain, that Mr. Macdonald was the first to obtain his flying licence on a Bristol. In the January following he went out to Australia with Mr. J. J. Hammond to demonstrate Bristol biplanes to the Government there. While in Australia he made many notable flights including one with General Gordon, Commandant of the New South Wales military forces, as passenger. He took the General up to 3,000 ft., and at that altitude flew over Sydney Harbour, Government House, Botany Bay and the military barracks.

Returning to England he was engaged, about 12 months ago, by Messrs. Vickers, Ltd., to test their machines, and he has held that position ever since. He did some remarkably good flying on the Vickers monoplane, fitted with a 70-h.p. Viale motor, that was present at Salisbury Plain during the Military Trials there.

His companion, Harold England, was an engineer in the employ of the aviation department of Messrs. Vickers, Ltd.

Our heartfelt sympathies go out to the families of the two unfortunate men in the sad bereavement they have sustained.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Annual General Meeting.

The Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Wednesday, March 19th, 1913, at 4 o'clock, at 166, Piccadilly, London, W.

Notices of motion for the Annual General Meeting must be received by the Secretary not less than twenty-one days before the meeting, and must be signed by at least five members. Wednesday, February 26th, 1913, is the last day for the receipt of notices of motion.

Committee.

In accordance with the rules, the Committee shall consist of eighteen members. Members are elected to serve for two years, half the Committee retiring annually. Retiring members are eligible for re-election.

The retiring members of the committee are :—

Griffith Brewer.	Prof. A. K. Huntington.
Capt. Bertram Dickson, R.F.A.	F. K. McClean.
John D. Dunville.	Alec Ogilvie.
Col. H. C. L. Holden, C.B., F.R.S.	Mervyn O'Gorman.
	C. F. Pollock.

Any two members of the Club can nominate a member to serve on the Committee, having previously obtained such member's consent. The name of such member so nominated, with the names of his proposer and seconder, must be sent to the Secretary in writing not less than fourteen days before the Annual General Meeting. Wednesday, March 5th, is the last day for the receipt of nominations.

Members are reminded that a ballot paper for the election of nine candidates to seats on the Committee of the Club will be forwarded to them at least seven days before the date of the Annual General Meeting.

Thames Aviation Disaster.

The Royal Aero Club deeply regret to record another aviation fatality, resulting in the drowning of Mr. L. F. Macdonald and his passenger in the Thames, close to Purfleet. On Monday afternoon, the 13th inst., at about 3.30 p.m., Mr. L. F. Macdonald with a passenger had just commenced a trial flight on a Vickers Biplane fitted with a 70-h.p. Gnome engine. They had only been in the air a few minutes when the aircraft fell into the river and sank almost immediately. Mr. Macdonald was one of the earliest British aviators, having obtained his Certificate No. 28 on November 15th, 1910.

The Royal Aero Club took immediate steps to investigate the accident, and Mr. Alec Ogilvie, accompanied by Mr. Perrin, the Secretary, were at Purfleet early on Tuesday morning, where they were joined by Capt. H. F. Wood and Mr. A. Low, representing Vickers, Limited. The Thames Police were then engaged in dragging the River, as neither the bodies nor the aircraft had been found. Details concerning the accident were collected from various eye-witnesses, and will be considered by the Accidents Committee of the Royal Aero Club at its meeting on Monday next, when a preliminary report will no doubt be issued.

Public Safety and Accidents Investigation Committee.

A meeting of this Committee was held on Monday, the 13th inst., at the Royal Automobile Club (by kind permission), at 8 p.m., when there were present : Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Mr. A. E. Berriman, Mr. G. B. Cockburn, Mr. F. K. McClean, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, and the Secretary.

Marske-by-the-Sea Accident.—The report on this accident was drawn up and ordered to be submitted to the Executive Committee with a recommendation that it be published *in extenso*.

Aviation Prize.

Mr. A. Mortimer Singer has written a letter to the Royal Aero Club offering a prize of £500, the Competition to be open to aeroplanes able to start from and alight on both land and water. The rules for the Competition are now being drawn up, and will be issued at an early date.

Gordon-Bennett Aviation Cup.

The cup having been won by a representative of the Aero Club de France, the race for 1913 will take place in France. The exact time and place will be announced later.

The nature of the contest will be decided at the meeting of the Fédération Aéronatique Internationale, to be held in Paris on January 28th, 1913, at which the Royal Aero Club will be represented.

Each club affiliated to the Fédération Aéronautique Internationale, has the right to challenge the holder, the Aero Club de France, and such challenge must be sent in before March 1st, 1913.

The Committee of the Royal Aero Club will select the three competitors to represent the British Empire, and intending candidates are requested to notify the Secretary on or before February 25th, 1913, of their willingness to compete, if chosen. Applications must be accompanied by a cheque for £20, the entry fee, which amount will be returned should the entrant not be selected.

Gordon-Bennett Balloon Race.

The cup having been won by a representative of the Aero Club de France, the race for 1913 will start from Paris on Sunday, October 12th, 1913.

Each club affiliated to the Fédération Aéronautique Internationale has the right to challenge the holder, the Aero Club de France, and such challenge must be sent in before February 1st, 1913.

The Committee of the Royal Aero Club will select the three competitors to represent the British Empire, and intending candidates are requested to notify the Secretary on or before January 28th, 1913, of their willingness to compete, if chosen. Applications must be accompanied by a cheque for £20, the entry fee, which amount will be returned should the entrant not be selected.

International Aero Show at Olympia.

The International Aero Show organised by the Society of Motor Manufacturers and Traders, supported by the Royal Aero Club, will be held at Olympia from February 14th to 22nd, 1913.

Members of the Royal Aero Club are admitted free on presentation of their membership cards.

A room in the Princes' Gallery will be placed at the disposal of the members during the exhibition.

166, Piccadilly. HAROLD E. PERRIN, Secretary.

FROM THE BRITISH FLYING GROUNDS.

Brooklands Aerodrome.

Saturday last, in the afternoon, storms of wind and rain were against any flying.

A large number of spectators, on Sunday, put in an appearance and witnessed some excellent flying, about a dozen machines being out at different times. The Vickers monoplanes, piloted by Messrs. Barnwell and Knight, made some excellent circuits at a good height, the new one (fitted with 100-h.p. motor) showing promise of great speed when completely tuned up. Two Bristol biplanes (Messrs. Merriam and Bendall) also made some splendid flights ; also the Spencer biplane (Mr. Spencer), the Ducrocq-Farman biplane (Mr. Alcock) and the Sommer biplane (Mr. Pashley). The new Coventry Ordnance Biplane, of which great things are expected, was also out.

An unusually large number of children turned up in anticipation of seeing Santa Claus arrive in an aeroplane, for they had been informed that no matter what the weather was like Santa Claus (Mr. F. Warren Merriam) had definitely promised to fly to Brooklands, and bring with him a goodly store of gifts ; and when Major Lindsay Lloyd announced that he had received a wireless message to the effect that Santa Claus was well on his way, and might be expected in about a quarter of an hour's time, the youngsters could hardly contain themselves with delight, and many were the keen pairs of eyes directed skywards, each child vieing with the others as to who should be the first to espy the approach of Santa Claus in the distance. Shortly after three o'clock, a great cry went up : "Here he comes !" And sure enough in the distance could be descried a Bristol biplane flying at a great speed towards Brooklands with Santa Claus at the helm and his magic sack of presents firmly secured behind him. A great roar of welcome went up from the youngsters, to which Santa Claus responded by gaily waving his hand, and after making

several graceful circuits, he suddenly swooped down and effected a very clever landing right in front of his young friends, to whom he made a brief speech of welcome, after which he commenced to distribute his gifts with a lavish hand, each child carrying off a present. Nearly 400 children were participants, and they showed their appreciation by giving three hearty cheers for Santa Claus, and one for his flying machine. So perfectly was Mr. Merriam disguised by Messrs. Clarkson that his friends failed to recognise him.

Owing to the time taken up in the distribution of the gifts, the racing programme had perforce to be considerably curtailed, and it was thus only possible to bring off a combined Quick Starting and Alighting Competition, which, appropriately enough, was won by Santa Claus himself (Mr. Merriam) on his Bristol biplane, Mr. Alcock on the Ducrocq-Farman biplane being second, and Mr. Pashley on the Sommer biplane third. Mr. Bendall made fastest time in the Quick Starting competition on the Bristol biplane, but was robbed of a prize by a miscalculation in landing. Mr. Spencer on a Spencer biplane also competed.

For to-day (Saturday) an Altitude Competition has been arranged. Entrants: Mr. Barnwell and Mr. Knight (Vickers monoplanes); Mr. Merriam and Mr. Bendall (Bristol biplanes); Mr. Alcock (Ducrocq-Farman biplane).

On Sunday a Bomb-Dropping Competition will be held, in which the following will take part: Mr. Merriam and Mr. Bendall (Bristol biplanes); Mr. Alcock (Ducrocq-Farman biplane); Mr. Spencer (Spencer biplane); Mr. Pashley (Sommer biplane); Mr. Knight (Vickers-Farman biplane).

Bristol School.—Merriam was first out on Monday last week for a test, taking Mr. Archer as passenger, then sitting behind Mr. Neville for several straights, this pupil showing signs of fine progress. Capt. Rickards went for a couple of solos, flying quite well, completing his first circuits in fine style. This same pupil was out later for three circuits, his solo and landing being made in fine style. Bendall was giving tuition to Messrs. Archer and Neville.

School work was resumed after breakfast, Merriam taking Lieut. Blatherwick, and then, with this pupil in pilot's seat, for several straights. Bendall was meanwhile out with Messrs. Archer and Neville, giving pupils several trips each. Capt. Rickards was out for a couple of solos, flying several circuits in really fine style. Merriam brought the morning's work to a conclusion by taking two pupils together for a circuit.

As soon as rain had ceased, Bendall made a test in the afternoon, afterwards giving Mr. Archer a tuition flight. Merriam also out for solo, then as passenger to Lieut. Blatherwick and Mr. Neville on straights. Capt. Rickards carried out two excellent solos, making four circuits, his landings being quite good. Mr. Lane got in some good straight flights, whilst Bendall was out with Mr. Neville, but wind was too bad for further work.

Flying could not be attempted all day Tuesday, owing to strong wind and rain. On Wednesday, Merriam made test of air with Mr. Neville as passenger, but found wind to be too gusty for school work. Merriam took Lieut. Blatherwick for a trial, Bendall being also out, but found conditions to be too bad.

Merriam went for a trial on Thursday, and as no improvement in the weather, work was continued in the hangars. On Friday, during fine interval, between pouring rain, Merriam made a trial, taking Lieut. Kchrmann, a new pupil, for his first trip, but wind was too bad for other pupils.

Pouring rain all day Saturday, which completely foiled all attempts at school work.

Ducrocq School.—Monday, last week, J. Alcock made two test flights, 10 and 12 mins. respectively. On Sunday he was giving an exhibition of aerial switchbacks and banked turns, he also taking part in the getting-off and alighting competition, gaining the second prize.

McAndrew got in some circuits during the day.

Monday, J. Alcock in a thick fog made several circuits. Tuesday, Mr. Ducrocq was in the air steering some very high circuits; Alcock also flying circuits with banked turns. McAndrew passed the tests for his *brevet* in good style, in spite of the fog and winds.

Vickers School.—Monday morning last week being very calm, quite a lot of flying was done on the Wyndham-Farman biplane. Barnwell made some circuits with Major Cameron behind, and then some straights with that pupil in the pilot's seat. Knight then went out for a few circuits by himself after which Major Cameron did about half an hour's solo flying, comprising straights and circuits. This pupil is showing very good progress.

Wednesday, in the morning, Knight tried to make a flight on the Wyndham-Farman biplane, but found it much too windy. In the afternoon Barnwell was testing for adjustment a new arrival, Monoplane No. 7 with 100-h.p. Gnome engine.

He was out Thursday again testing No. 7 monoplane in the morning and also in the afternoon with Knight as passenger.

Some good circuits were made on Friday by Barnwell in a gusty wind on No. 7 monoplane, he afterwards carried Capt. Salmon as passenger.

Barnwell was doing further circuits on Sunday on No. 7, both solo and with passenger, testing propellers. Knight was also out propeller testing on No. 5 monoplane. Too windy for pupils.

Eastbourne Aerodrome.

Rough weather prevailed during the greater part of last week and very little practice was put in. Sunday, however, was a perfect day, but unfortunately most of the pupils were away, so very little work was done. Hammond made several flights on the Bristol and took up a passenger in the afternoon. Monday turned out another good day, and shortly after daybreak Mr. Fowler was out testing the Bristol. After making a solo he took up Yates for a short flight. Lieut. Brown then took up the pilot's seat, and after making several circuits Mr. Fowler sent him for his first solo which he completed in splendid style. During the course of the morning Lieut. Brown did several more solos and made such progress that it was decided to let him go for his ticket. Starting for his first half about 12.15, he flew with extreme regularity, and by 1 o'clock had completed both the tests. His performance was one of the best *brevet* flights that has been put up at the aerodrome, and he gives every promise of being a first-class pilot. After lunch, Fowler commenced school work again. Lieut. Minchin had his first turn in the pilot's seat, and Thompson also made a good flight, with Fowler in the passenger seat. Later on, Mr. Lerwill went for a solo and did several circuits, flying with his usual steadiness.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Monday, last week, was rather windy, but Mr. A. H. Bayetto was getting in some good rolling practice under supervision of Mr. Louis Noel.

Wednesday, at 8.50, Mr. R. H. Carr out doing straights with Mr. M. Manton on No. 7 machine, and later out with Mr. Noel, making good progress, it being somewhat misty. Mr. A. H. Bayetto rolling on 4B machine.

People visiting the London Aerodrome during the week to witness flying were not disappointed, as there have been good exhibition flights every day, except Tuesday, the pilots being Messrs. Noel, Manton, Desoutter, Cheeseman, Verrier and Turner.

Blackburn School.—Monday morning, last week, Mr. H. Blackburn did a 10 mins. trial flight on rolling machine, followed by Messrs. Christie and Buss with 20 mins. practice each in straight flights. In the afternoon, Messrs. Christie, Glew, and Laurence Spink flew straights for an hour and a half, and Mr. Morris got in 10 mins. rolling practice in charge of Mr. H. Blackburn.

Tuesday was too windy for work, but Wednesday, school was out in morning and afternoon under Mr. H. Blackburn's instructions, two trial flights being put in by Mr. H. Blackburn; Mr. Laurence Spink, 45 mins., Mr. Buss, half an hour and Mr. Glew, half an hour in straight flights, Mr. Morris, 15 mins. rolling practice, all on the rolling machines.

Weather foggy and windy. Thursday, Friday and Saturday, it was also windy and raining, Mr. Foggin the capable Blériot flyer joined school for practice, having bought a Blackburn for exhibition purposes.

Sunday afternoon, flight of half an hour by Mr. H. Blackburn on the school rolling machine, which flies very well and safely if a trifle slow. The flight was quite interesting to watch all the time.

Blériot School.—Lieut. E. Conran was out on No. 3 on Wednesday last week for practice but found the wind somewhat trying so wisely discontinued. During the week the staff has been very busy overhauling machines in the sheds, and as soon as the weather clears up the whole of the school's fleet of machines will be able to fly circuits in good style.

W. H. Ewen School.—Monday, last week, turned out a very fine day for school work, and some splendid flying practice was put in by the pupils under the instruction of Mr. Lewis W. F. Turner and M. Baumann. Commencing at 10.30, the pupils were out nearly the whole day with only a short break for lunch. After a test flight on the 28-h.p. Caudron by M. Baumann, the machine was handed over to Lieut. Mexly, and Messrs. Zubiaga, McGregor and Prosser who each in turn made a number of straight flights, handling the biplane in an excellent and confident manner.

Mr. Turner was out with both the 35-h.p. two-seater and the 60-h.p. two-seater Caudrons, on which he was doing some excellent flights. Later he gave a passenger flight to Capt. de Villiers, the inventor and demonstrator of the wireless airship.

The weather on Tuesday and Wednesday was much too rough to allow pupils to get out for flying practice. Mr. Turner was doing some flying on the 35-h.p. Caudron. The remainder of the week was also blank on account of the weather, and pupils were occupying their time assisting in the workshops.

On Sunday, Mr. Turner was out several times on the 60-h.p. Caudron, putting up some very fine flying, and also giving several passenger flights.

Salisbury Plain.

Bristol School.—Jullerot and Busteed each made a trial of the air on Monday, last week, afterwards Lieut. Rees setting out for the necessary tests for his *brevet*, which he successfully accomplished, his observers being Major Brooke-Popham and Lieut. Wadham.

Lieuts. Vernon, Marix and Littleton each made their first solos in quite satisfactory style, whilst Lieuts. Bowhill and Bigsworth carried out two trips each in good style. Lieut. Vaughan was out with Busteed and Jullerot for biplane tuition, the latter then ascending for a trial of a tandem monoplane, afterwards giving Lieut. Tod tuition in the side-by-side. Busteed was up for a couple of trials on an 80-h.p. monoplane, and also of a school monoplane. England gave Lieut. Tod tuition in the side-by-side, and then in a biplane to Lieut. Vaughan and Mr. Towers.

Prince Cantacuzene was out for his first solo on the 80-h.p. Bristol monoplane with a passenger and put up a long flight round the Plain. In the afternoon the Prince was making a good cross-country flight round Salisbury, Shrewton, and Upavon in a wind of fully 20 miles per hour. Jullerot gave tuition to Lieut. Vaughan, and England to Mr. Towers; Busteed making two tests of a school monoplane. No flying was possible all day Tuesday on account of bad weather, work being confined to the hangars.

Very windy all day Wednesday. In the late afternoon Busteed made a trial of one of the 80-h.p. monoplanes, the velocity of the wind at times being registered at close on 50 miles per hour. This was the only flight made. On Thursday high wind all day completely foiled all attempts at school work.

Jullerot went for trial on Friday at about 10.30, but gusts were still far too strong for pupils, who spent yet another day on the machines in the hangars. On Saturday, rain and wind yet again compelled indoor work.

Royal Flying Corps.—The abominable weather in the early part of last week was responsible for several blank days, practically no outdoor work being possible until Monday, when Major Brooke-Popham was out, with Sergt. Bruce as passenger, on biplane 203, the engine of which has been overhauled, testing and practising fire signalling. Another trip of 6 mins. was made with Sergt. Sharpe, but when he went up for the third time he found the warping not quite right, so landed for machine to be tested.

Lieut. Carmichael was on Maurice Farman 214, and put up an excellent flight of 1 hr. and 10 mins., flying at a height of 2,150 ft., from which he made his first spiral *vol plané* in fine style. He went up again with Mechanic Martin as passenger, and on landing found a rudder wire broken. This was replaced, and a 20 mins. flight was made with Private Willis as passenger. Lieut. Wadham was scouting around the Downs until the mist got too thick, and on landing the skid rubbers broke through taxiing on rough ground.

As soon as the fog lifted on Tuesday Major Brooke-Popham was out on biplane 203 with Sergt. Bruce. In a second trial to a great height, passing in and out through the clouds. Lieut. Carmichael on Maurice Farman 216 made a flight to Andover and back; on landing he subsequently took Sergt. Keegan as passenger for a scouting trip. Another officer was out on Maurice Farman 216.

South Farnborough.

Royal Flying Corps.—Active preparations have been taking place during the last few days, pending the departure of No. 2 Squadron to their new quarters at Montrose in Scotland. An advance party proceeded *en route* for Montrose early on Wednesday morning to prepare things for the main body. It is intended to fly the machines belonging to the Squadron to their new base, and up to the time of writing it was not definitely known what day the long journey by air would commence. Parties equipped with tools and spares will proceed by road in motor, keeping in touch with the aeroplanes in case of breakdown through any causes. It speaks volumes for the pluck and enthusiasm of the officers, who have undertaken the responsible and by no means easy task of transporting the machines by air, especially when one considers the distance and the time of the year (when the weather is anything but ideal), saying nothing of the difficult nature of the country over which their journey lies. It is to be hoped that good luck will attend the pilots on their journey.

Last Thursday the few people who ventured on to Farnborough Common to watch the flying, had an opportunity of viewing a rather strange looking machine, reported by the daily press as a new type of "warplane." The machine in question is an experimental biplane, constructed and designed in the Royal Aircraft Factory, and was undergoing certain tests on Farnborough Common at the hands of Mr. De Havilland, with regard to its efficiency. The machine is a biplane with staggered planes of the well-known B.E. type, and the lower plane carries a short bluff looking fuselage, in the forward end of which is mounted a water-cooled Chenu engine of the latest pattern. The engine power is transmitted to the propeller placed close to the near end of the short fuselage by means of a shaft-drive, through a gear-box. The propeller in consequence running much slower than the engine. The *empennage*, rudder and elevators are attached to a large diameter steel tube, on tail boom. This steel tube runs through the propeller hub and terminates in a running bearing in the gear-box. Bracing wires to the planes hold the whole arrangement in such a way as to prevent the tail from twisting. Comparing this arrangement with the ordinary tail boom system, a bursting propeller would produce the same disastrous results, as it would certainly cut the bracing wires loose thus allowing the tail to collapse.

Last Wednesday although a gusty 40-mile wind prevailed, Capt. Becke made a couple of fine flights on Maurice Farman 215, on one occasion taking up Lieut. Christie for a short spin. Thursday was a similar day from a weather point of view, and Major Raleigh, No. 4 Squadron, did two fine spins on Breguets 210 and 213, being up about half an hour, despite the trying conditions of the weather.

On Friday, weather conditions had improved, and Major Higgins arrived from Salisbury Plain on Maurice Farman 425. Major Raleigh was also practising the handling of a new Maurice Farman 302, afterwards making a couple of very fine flights on Breguet 213. Major Raleigh went out also in the afternoon on Breguet 210, accompanied by Major Higgins.

Saturday was a miserably wet day, and no flying took place, it being totally unfit for the machines to be brought out. This week opened rather unfortunately, for, on Monday, Major Raleigh had a very narrow escape from being badly burned. He was out on Maurice Farman 302, and a back-fire from the 70-h.p. Renault engine ignited the petrol at the carburettor, with the result that the machine was totally destroyed. Major Raleigh, up in the pilot's seat, had a very narrow escape, indeed, from serious injury. Major Raleigh was also out on 213 Breguet machine, as was Capt. Beor for a short while. Lieut. Chinnery was out as well practising straights. On Breguet 210 Major Raleigh made four splendid flights, and had a passenger on each occasion.

Tuesday, there was moderate south-easterly wind blowing, and the sun favoured things for the flying men. On Maurice Farman 266, Lieut. Herbert made a couple of fine flights, on one occasion taking Sergt. Mead with him. On Maurice Farman 215, Lieut. Herbert and Dawes were out about 15 mins., Lieut. Herbert afterwards taking Lieut. Martin for a short spin. Major Raleigh was also on Breguet 210 for several trips, taking up Sergt. Wright, Sergt. Hunter, Capt. Board and Lieut. Maclean. Tuesday again saw Major Raleigh on Breguet 210, accompanied by Capt. Board for a short flight of 10 mins., and Lieut. Maclean for about quarter of an hour, when they reached an altitude of about 1,400 ft. Lieut. Chinnery was on the same machine for about the same length of time, and Capt. Beor was away about half an hour. Mr. De Havilland was doing some of his usual fine performances over the Common on B.E. 2 and 204. On Machine 211, Sergt. Hunter made two good flights in fine style.

FLYING AT HENDON.

ON Thursday of last week a number of visitors turned up at the aerodrome and several exhibition flights took place. The first of these was given by M. D. Manton who made a few circuits of the aerodrome on the 50-h.p. Grahame-White 'bus. Louis Noel also put up a couple of flights on the 80-h.p. Henry Farman biplane, taking with him on one occasion a passenger. Both flights lasted for about 15 mins. Marcel Desoutter's first attempt at his share of the afternoon's entertainment on the Blériot monoplane resulted in a broken petrol pipe just as he was about to get away. When this was put right and he at last got going, the engine developed troubles so he had to descend and have matters put right. Ultimately he managed to put in two very good circuits. During the afternoon the new Grahame-White miniature biplane was brought out of its shed and given an airing.

Saturday last was too impossible for words! so we will pass on to what took place the following afternoon, Sunday. In the first place it was beautifully fine, and, secondly, there was a very good attendance of visitors. The result was a remarkably fine display of exhibition flying which lasted until late in the evening. Louis Noel ascended first in the 80-h.p. Henry Farman biplane, taking with him a passenger. He was followed almost immediately by Manton on the Grahame-White 'bus and Marcel Desoutter on the Blériot monoplane. Sydney Pickles—in a weird form of head-gear—made a flight on the Grahame-White 'bus, and Richard T. Gates also went up in the same machine and in the same head-gear.

Other contributors to the afternoon's flying were Lewis Turner (and passenger) on the Caudron biplane, with a 60-h.p. Anzani engine, and H. Blackburn on the 50-h.p. Blackburn monoplane. All five of the above mentioned machines were in the air together at one time during the afternoon. Towards the close of the proceedings, Desoutter made a picturesque flight on the Blériot monoplane, his machine looking very pretty against the evening sky.

FLIGHT

FROM A PILOT'S NOTEBOOK.

[*In the hope that they may be of use to others, the following records from a private notebook, which was started by the late Lieut. Parke about three months before his death, are published by the wish of his relatives.*—ED.]

Cody's "Circuit" Biplane. September 30th, 1912.

I FLEW this in November, 1911, then fitted with a Green engine (60–80-h.p. auxiliary ports). It is a delightful machine to pilot, and easy; the control, though unconventional, being very suitable for the machine.

The great point about the control is that the column is continued above the wheel. This column is grasped with the left hand, which does all the balancing. The right hand is placed on the wheel only when required to steer. The warp and rudder are interconnected, the warp being very low-geared, while the rudder is balanced and is high-geared. The amount of power required from the pilot is small; on the other hand, the gear between rudder and *wheel* is very low, making the machine a little awkward to steer on the ground, as it takes some appreciable time to get the rudder over.

One disadvantage of using so much rudder to preserve lateral balance is that if you try and land while using the engine, the movement of the control to correct for torque may have rather a disturbing effect on "direction," which is a nuisance near the ground. It is thus easier to land *en vol plané*. Though easy to control, this machine wants just watching all the time for lateral balance, probably due to the inverted dihedral. You keep on just slightly working all the time, but the amount is very slight. Fore and aft, she more or less looks after herself.

When I smashed her, I had a big load up, turned down wind whilst forcing her to climb; she lost speed, started to rock and finally side slipped when about 30 ft. up. Directly she side-slipped, her big rudder area put her nose down, and I started to pull her up with the elevator. Another 15 ft., and the smash could have been saved, as she was starting to answer quickly. Unfortunately the small front wheels actually hit in a ditch and brought her up all standing, with considerable damage; I was shot out head over heels, but quite unhurt. My helmet showed marks of having saved me from some nasty cuts by wires. My passenger was more or less jammed in his seat and also unhurt.

I had previously flown this machine solo from Farnborough to Brooklands and back, landing at Brooklands, on that occasion I made a *vol plané* with engine completely stopped from over 2,000 ft.

Note that the elevator was almost dead balanced in normal flight. When going faster (as in a *vol piqué*) it pushed the control back; when driving her up too much, it pulled the control forwards. I do not think the elevator carried much load with either the Green or with the Austro-Daimler engines.

Caudron Biplane (35 Anzani). October 25th, 1912.

My experience of this machine up to date has been gained on the machine belonging to Percival (Aero Construction Co.). I flew her for some trial flights, and then in a couple of small races at Brooklands, one cross-country and the other round pylons. This latter was the only pylon race I have ever flown in. I do not care much about them, thinking them unnecessarily dangerous, owing to the danger of machines passing each other rather close when rounding a pylon.

What has chiefly impressed me about this little machine is its extreme steadiness in the air, especially when considered in relation to its small span and light weight. It appeared to have quite a high degree of inherent stability, probably due to its flexible surfaces, though actually I did not test this systematically, being at that time too fond of correcting the smallest deviations.

The machine is rather heavy on its lateral and longitudinal controls, and would, in my opinion, be very much improved by the substitution of a wheel control for the standard universal lever. It is a very easy machine to fly on account of its steadiness and ample control which it answers very well.

For pupils, I am inclined to think that the rather heavy controls are an advantage rather than otherwise. One thing I noticed was that I tended to land much more "tail high" than usual, from which I deduce that she has not got a very good gliding angle. Also, one has the impression that one is coming down much more steeply (*en vol plané*) than is really the case. Left alone when turning sharply, she takes up a very nice bank, but I have no reason to fear her overbanking herself. In turning sharply either way she has a strong tendency to dive, which can be resisted by the elevator. I attribute this to her sharp bank making the rudder act partly to raise her tail, especially as the pressure remains fairly high on the *inside* of the rudder. At any rate this is so up to 180° turns; more than that I did not try. There was a good deal of vibration from the engine, rendering the Gnome-type oil indicator useless. That, in conjunction with the rough seating accommodation and moderate weather protection, render her less luxurious to fly in than many machines. Still, considering her very low price, I think she is perfectly marvellous. Her proper duty, no doubt, is the school, for which she is admirable; but she is also splendid for the private owner of very limited means, as I should have no hesitation in using her for any amount of cross-country work. She has a very good margin of lift, and rises quite fairly quickly and stops well. Her Y Anzani engine has a very good reputation and only requires proper intelligence in the way it is looked after. I know from close touch with the Deperdussin people, when Sabelli was with them, that once the Y Anzani is given enough oil it is very reliable and wants little attention.

Deperdussin Monoplane (70 Gnome). October 26th, 1912.

A few days ago, through the very great kindness of Lieut. Grey, I had a short (very short) flight on his (Service) machine of the above type. I only did a single circuit, having to come down as the engine was not running properly.

She struck me as being a very easy machine to handle, but the view from the pilot's seat, as for landing, might be a good deal better. Having a very good length of machine in front of the pilot, it would certainly be a help. What I noticed particularly, was that I was pushing very hard on the control wheel, *i.e.*, carrying a big load on the elevator flap, though this may be partly due to the fact that I was purposely keeping her from climbing. Also, in spite of its being almost a calm, I could feel the wheel kicking at me strongly, *i.e.*, automatic warp. Owing to having a big weight on the tail skid she does not steer over well on the ground, though obviously the pilot can soon, with practice, overcome this. My flight was too short to test for inherent stability, &c., though from the way she handled I should expect to find she had a certain amount, though probably very lively and terrifying at first, if left alone. She is very light on her rudder and answers it well. With the scuttle-dash now fitted, the pilot is quite reasonably comfortable, but passenger flights have shown me that though the passenger can see very well, his accommodation is the very worst I have ever experienced; he gets his head blown off, and his lower part is in a "cave of winds."

Handley Page Monoplane. October 20th, 1912.

There is no doubt that this 'bus is of a really fine and extremely promising design; whilst not quite so efficient as, say an Avro (W.O. type), it does not do at all badly. It flies at, as far as I can judge, just under 55 m.p.h. with a probably unsuitable propeller (Blériot-Chauviere Circuit de l'Est type) practically no difference; indeed, she gave no sign of being overloaded with two children totalling 16 stone in the passenger seat. She is certainly a bit slow at getting off the ground, and I do not make her climb fast, but the latter has probably got something to do with me, as her ordinary gentle rocking motion probably makes me think I have got her *cabré*, when really she is going up perfectly all right; *i.e.*, she would climb faster if she were made to.

Now as regards her inherent stability: her lateral stability is as near perfect as I can imagine; she just simply floats about quietly, quite regardless of remous, propeller draughts, &c.; you can feel them hit her and her consequent "automaticing," but it does not worry her at all. As regards banking, she takes up her own angle quite naturally; she appears to be moving on an approximately uniform path after turning the first 135° (about), and for trial purposes I have frequently extended the turns to over 360°. This makes no difference whatever to her; she simply continues as sweetly as possible, everything remaining unchanged, including the pressure on the rudder, which, though very light (a possibility of observers' error therefore) appears to always remain on the *inside*, *i.e.*, when turning to the *left* with uniform angularity, the pressure is always on the *left* foot, though the force is less than whilst accelerating.

To bring her off a turn I used, at first, to use the warp at the same time as I ruddered, but have since found this unnecessary, as she comes up quick of her own accord; for trial purposes I have reversed the rudder from half left to half right, and watched her swing over and pick up her bank on the reversed curve without needing a touch of the warp.

With reference to this it is interesting to note that after straightening out after a sharp turn she will "hunt" laterally for a short time to pick up her normal lateral altitude. I noticed this particularly once when shutting off to *vol plané* rather low from a sharp turn; the hunting gave me quite a lot of work to do with the warp to make her take the ground on an even keel. Probably it would not matter a bit touching one wheel a good deal first (with the excellent type of undercarriage fitted), but it looks bad.

Natural control, she has any amount of it, though the warping wheel is rather low geared, to my mind; she is quite reasonably quick on the warp.

Longitudinal stability: I have so far been unable to determine accurately whether there is any serious improvement here over other decently designed machines on standard lines. Longitudinal control is usually so easy that one would not notice this much; it should be tested by having some means of holding the elevator control fixed, which is not possible by hand alone. I think she must have something subtle in her longitudinal arrangement, as, in spite of the passenger's seat being right back in rear, the difference between 16 stones and 6 stones make no appreciable difference to balance or control in the air.

She answers her elevator well, but gives the impression of having that control rather low geared, too; possibly that impression is helped by somewhat increased moment of inertia due to passenger's position; anyway, I very noticeably use more motion of the control column to land than I am accustomed to do on other machines.

She has a very good gliding angle—about the same as the Avros (say 1 in 6·5)—and is consequently very easy to land in an aerodrome, particularly as her undercarriage is very "squashy" and with no tendency to bounce; I believe its springs are worn out. She runs rather a long way, as the tail skid keeps her tail somewhat high.

Her rudder has a good aspect ratio, and, though unbalanced, its control is very light; I only rest my toes on the bar. The seating accommodation is most excellent, far better than is usually found, both pilot and passenger get excellent protection from the wind, except just their heads.

In conclusion, she really *flies*, and, for pure pleasure of flying in, is miles ahead of anything else I have ever been in as pilot or passenger. She is, to my mind, an extremely safe and excellent machine.

Handley Page Monoplane (70 Gnome). November 15th, 1912.

I had this machine out for the first time last Saturday. She was flown a little at the Military Trials by "Petre the Painter," but has since been reconstructed with different wings.

She is extremely interesting compared with the "50" machine. Longitudinally she is dead stable—*i.e.*, I held the elevator control, as far as I could tell, rigid, and she never varied a bit. The "50" is good, but not quite so good as this. Laterally, she rolls in a most unpleasant way, and banks to an absolutely appalling angle if left alone; I did not after the first time. Though rolling heavily, she recovers herself perfectly without any use of the warp; she appears to have a very regular periodicity, which I hope to be able to time. She lacks the v.s. directional stability of the "50"—*i.e.*, on a roll she requires a little rudder to prevent her swinging to the low side. This use of the rudder is distinct from the use I very often make of it to stabilise a machine by sharp little pushes. In turning, as soon as she approaches a uniform curvature, one continues to turn with a negative pressure on the rudder—*i.e.*, on the outside thereof. I have not previously experienced this, even on the all-enclosed Avro, though I am told several types have it, notably Ogilvie's Wright and the B.E. 2.

EDDIES.

WHAT a needless waste of two most useful lives was the accident in the Thames at Erith on Monday last, when Leslie Macdonald, the clever Vickers pilot, and his mechanic, England, were drowned. Evidence available at the present time points strongly to a badly misfiring engine as the direct cause of the accident. While recognising Macdonald's undoubted ability at piloting, one cannot help but decry the lack of caution that prompted him to start off when it was evident that his engine was not pulling so well as it should have been. It is not an uncommon occurrence for an engine, which misfires a little when first started up, to get into its stride and develop its full power after it has been running a minute or so. Probably with this thought in his head Macdonald and his companion started off. Instead of the power increasing, unhappily, it fell off, with the terrible result that we have all read about and sorrowed over.

* * *

The sad accident that overtook Lieut. Wilfred Parke and his passenger Mr. Hardwick may be attributed to the same cause. And what are the lessons to be learned from these occurrences? As far as I can see at the present time there is no new lesson to be learned. It is the case of an old lesson brought home with increased force. The moral to the pilot is—be careful not to attempt too much on your machine unless the engine is running to your complete satisfaction. If the engine is running badly no great amount of harm can come to him if he keeps to straight line flights within the confines of his aerodrome. It is manifestly unsafe to attempt anything more, much less cut across country, if the motor is not working up to a speed closely approaching its normal number of revolutions.

* * *

And there is no excuse for a pilot not knowing when his engine is running badly. If a misfire is the cause of the poor running of the motor, it can generally be distinctly heard. If the mixture is at fault, a glance at the revolution indicator will confirm any suspicion. Failing that, and supposing the pilot had started off, I believe I am right in saying that the pilot's own instinct, aided by his sense of touch and hearing, will tell him the moment he eases his lever back for ascent, whether the machine is flying as well as it ought to. If a machine is "right" it should, figuratively, fly on its own. It should not need any special forcing or, as aerodrome people say, "hoicking" to get it to climb. The pilot, if he has that sympathy with his machine that every pilot ought to have, knows immediately if the machine is not up to the mark for work. Instead of continuing in the hope that "it will be all right in a minute," he should, or more forcibly he must, come down at once and have his engine attended to. Otherwise there will be a recurrence of accidents such as have happened to Lieut. Parke and Mr. Macdonald, with both their passengers. The lesson is indicated strongly enough. Let pilots take it to heart now.

* * *

At the New Year celebrations among the pilots and pupils at Buc held at the recently erected temporary pavilion there, M. Blériot announced that he was about to erect on the ground a thoroughly up-to-date club house for the use of the aerodrome *habitués*. The central section of the building is to constitute an enormous hangar, sufficient to house thirty or forty machines, and from the roof, which will be turned into a roof garden, visitors, whilst partaking of refreshments, will be able to watch the exploits of the flying men. The club house will further have sleeping accommodation, a restaurant, a garage, an American bar, and various rooms set apart for billiards and fencing, and recreations of that character.

* * *

There was to have been erected a club house at Hendon last year. Perhaps this year may see it built and established. It is certain that, with such a club house, the Hendon ground would become even more of a popular *rendezvous* than it is at the present time. Carrying the idea still farther, it is not outside the bounds of conception to imagine that the venture would become as popular as Hurlingham or Ranelagh, even if it were not quite so exclusive. Also, would not such a club

house serve as a most convenient headquarters for the proposed Lodge of Freemasons who fly or who are connected with the industry in any way?

* * *

Talking of Hendon reminds me that the truly horrible road, Collindale Avenue, leading from the Edgware Road to the aerodrome gates is at last receiving attention, and before long it should be possible to go from one end of the road to the other in a car without being bounced about like a pea on a drum. Quite a long section of the road, that nearer to the aerodrome, was attended to about a year ago, and goodness only knows why the other section was not touched. However, I suppose that urban district councils always have been and always will be, ponderous people to move. At any rate, it is comforting to know that the work of improving the road surface is at last about to be commenced upon. One would have thought that the local authorities could have at least interested themselves earlier in the matter, for there is no doubt that the crowds of people that are regularly drawn to the aerodrome have greatly benefited the district.

* * *

Which also reminds me that negotiations are at present in progress for the running of a service of motor omnibuses from Hyde Park Corner to the gates of the Hendon ground during the Easter meetings. *En route* they would pass the Marble Arch and run along the Edgware Road, collecting passengers, if they were not by that time fully loaded, from the densely populated Maida Vale, Kilburn, Brondesbury and Cricklewood districts. Such a service would be a great convenience to sightseers going to the aerodrome, and I should not think for one moment that the London General Omnibus Co. would have cause to grumble at the extra receipts that would accrue.

* * *

I am wondering whether the mysterious Dover "aircraft" after all is found in the suggestion that the noises were due to a motor boat "Sappho," owned by a Mr. Walker, which was known to have been entering Dover Harbour with its engines unsilenced at the very time when the dirigible was supposed to have been passing overhead. In that case, where did the bright rapidly moving light come from? Could it have been supplied by imagination? If it indeed were a dirigible, where did it go to, for it is hardly conceivable, since it disappeared inland, that it could have continued its cruise without being noticed by other people.

* * *

However, whether it was a dirigible or only a motor boat that caused the alarm, the mere fact that there is apparently no definite evidence as to which it was goes to prove there is something radically wrong with our coast defence. Searchlights there are in plenty, both at Dover, and, for that matter, at Sheerness, but were they used?

* * *

A new dirigible shed, 550 ft. long, 120 ft. wide, and 112 ft. high, is about to be erected to the order of the Admiralty, on the Medway. It will have a steel skeleton, and be covered on the outside by corrugated iron sheets. The sliding doors alone, with their fittings, are estimated to weigh no less than 550 tons. The work will be carried out by Messrs. Hill and Smith, Ltd., of Brierley Hill, who are responsible for the construction of the airship hangar that is just being completed at Farnborough.

* * *

Mr. B. C. Hucks, the well-known Blériot flyer, whose sound and steady handling of his two-seater monoplane is always a delight to watch, has arranged to give exhibitions at Lincoln on Wednesday, January 22nd, and on the Friday and Saturday following. That exhibition finished, he intends going on to Norwich, but the date for the latter place is not yet definitely fixed up. By the way, he tells me that he is looking out for a reliable manager to whom he can trust all arrangements connected with his flying exhibitions. I shall only be too willing to see that letters sent to Mr. Hucks, care of FLIGHT offices, are forwarded to the proper quarter.

* * *

It is rather interesting to recall that Hucks probably made something of a record in combined motoring and flying during the time he was giving exhibitions at Birmingham in December. For eight days altogether he was flying there, the first five of them being consecutive days, on each of which he motored from London to Birmingham on his Hupmobile car, did approximately 50 miles of flying there on his two-seater Blériot, and motored back again to London after the exhibition was over. In this way during those five days he covered something like 1,350 miles with the monoplane and car.

"OISEAU BLEU."

THINGS WE SHOULD LIKE TO KNOW.

WHAT the lady with a camera at Hendon meant when she asked our official "plate fogger" if it were possible to get a photograph of a flyer "exposed with a cap."

? ? ?

How G. W. is enjoying his holiday.

? ? ?

What key is the chord of an aeroplane in.

? ? ?

Is it governed by the pitch of the propeller.

? ? ?

If a machine and pilot together weigh 2,000 lbs., how much does the pilot weigh when writing his autograph for "Gladys." Bow Wow.

? ? ?

Who was the landlady who, when interviewed *re* "digs" said, "I'm very sorry sir, but I don't take gentlemen, only aviators."

? ? ?

Isn't Blackburn (clever pilot though he is) banking his "bus" just on the "limit."

? ? ?

Can YOU tell us—

When mathematicians say a machine WON'T fly and it DOES,
And when a machine built on mathematical lines SHOULD fly and it WON'T. It does not prove that mathematics is wrong.

Neither does it disprove that G.W. + N. = H.F. BUT if the c.p. being too far behind the c.g. + a small angle of incidence + the negative pressure on the tail elevator, turns an aeroplane into a taxicab, and N. + a slide rule is = to the occasion, what the XYZ have all the "told-you-so's" got to fuss about.

? ? ?

How it is all these phantom airships can fly over fortified towns without being seen.

? ? ?

Have we any searchlights on the coast.

? ? ?

Will it be the same when it's the "real thing."

? ? ?

Who says we are not progressing? The War Office have rented *one* of the hangars at Eastbourne. Now we SHAN'T be long!

? ? ?

Is "red tape" a good thing to tie an industry down with.

? ? ?

This one for Pickles. Where DID you get that cap.

? ? ?

Manton can have this one. Will you please stop that right-angled-banked-spiral-nose-dive-side-slipping-shiverer. We don' like it, and a "box kite" is not a "performing equation."

"WILL O'-THE-WISP."

HYDRO-AEROPLANES.*

By V. E. JOHNSON, M.A.

**Author's Note.*—Revised from a lecture delivered before the Sheffield Model Aero Club, November 28th, 1912. The portion of the lecture which dealt with models has been omitted, and other matter substituted for it. Where certain names or makes of machines are quoted as belonging to certain types, it merely signifies that the makers have constructed such types, not that they have confined themselves to the types specified; there are, of course, one or two makers who have, practically speaking, confined themselves to one type, but this is by no means always the case. Generally the best known type is cited.

A HYDRO-AEROPLANE is a machine capable of travelling over the surface of the water, rising from it, flying through the air, and alighting once again on the surface of the water. A hydro-aeroplane then *can* be simply an aeroplane in which the wheels are replaced by floats.

An aeroplane rises from the ground when it has attained sufficient speed for the downward acceleration which it imparts to the air molecules is sufficient to support its weight in the air.

Now it is obviously much easier to obtain the necessary speed while travelling over the surface of firm ground than when travelling partly over and partly through a more or less yielding fluid such as water. It is thus quite easy to see that in the new art of flying, the birth of the aeroplane should take place before that of the hydro-aeroplane. The initial difficulty in the case of the latter is to travel over the surface of the water at a sufficient speed in order to reach the necessary velocity for flight, the resistance offered by any form of float being considerably greater than that of wheels.

One must not think, however, that the invention of the hydro-aeroplane dates from the year 1912, for a long time previous to that inventors had endeavoured to realise the idea of "getting off" the water. In the early days of aviation, this mode of launching was employed concurrently with launching upon wheels, because the early aviators saw by this means a method of rendering falls less dangerous both to themselves and to their machines.

The first hydro-aeroplane to be constructed, and actually put to a practical test, appears to be that of Kress in the year 1901; but he had not a motor of sufficient power, and was thus unable to rise, and was finally upset by the wind during a storm.

Hargraves had designed and partly constructed what he termed a steam aqua-aerial machine—the machine, it would appear, was never completed owing to lack of funds. The manner in which it was proposed to float the machine is worthy of note. There were

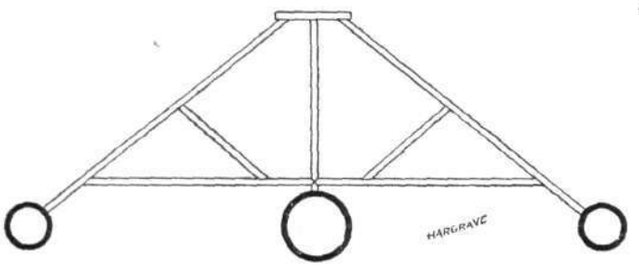


Fig. 1.—Hargrave's floats.

three floats (see Fig. 1), a main central one, whose dimensions were: Length, 25 ft. 7 ins. by 10 ins. in diameter, tapering to 4 ins. in diameter at the tail and 6¾ ins. in diameter at the bow; weight 25 lbs.; two outrigger floats (for lateral balance) 5 ft. 6 ins. long by 6¾ ins. in diameter, displacement some 60 lbs. each and weight 2½ lbs.; width over the outriggers, 7 ft. 6 ins. It will be noticed that the design is of the catamaran† type.

Later on, in France in 1905, Archdeacon and Blériot made, with Gabriel Voisin, experiments with hydro-aeroplanes, towed by a rapid motor boat. One of the earliest motored aeroplanes constructed by Blériot was mounted on floats, and experiments were made with it on Lake Enghien; he was not, however, able to rise from the water, this method of launching requiring too much motive power. It was Henri Fabre who constructed the first successful machine (see Fig. 3), and it rose from the water for the first time on May 21st, 1910, in the Bay of Martigues, near Marseilles, when it

† The Cingalese catamaran is a log of wood rounded underneath and scooped out, with two planks lashed on the top. The Mauritius catamaran is an ordinary boat with a smaller boat at the end of the outrigger, in which is set a peculiar kind of mizzen (sail). In the Fijis it becomes a double canoe, with both hulls exactly the same, carrying a platform—having just a little play—so as to permit of the individual peculiarities of the canoes being sufficiently humoured. Should anything go wrong with one of the floats (canoes) the raft simply settles on to the surface of the water. Their—comparatively speaking—great breadth renders their lateral stability extremely good, and an ordinary capsize is out of the question. The flying proa of the Ladrones, which can travel 20 knots an hour on a beam wind, has its hulls (floats) quite flat on one side (see Fig. 2), and thus avoids the "funnel" difficulty which was found to occur in the case of the Castilia and other steam catamarans, where the inner side of the hull being curved the water was heaped up as it rushed through the narrowing strait.

made a flight of 500 metres at a height of about two metres above the water. The machine used was a type of Canard monoplane, with wings carried on a specially constructed girder and the surfacing

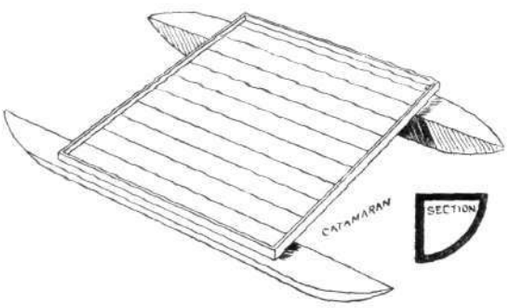


Fig. 2.—A catamaran.

was so arranged that it could be "clewed up" in order that less surface should be offered to the wind when floating on the water.

It rested on three floats of the "ricochet" type, the plan form of which was square, flat bottomed, with a curved upper surface and set at a rather large angle of incidence, see Fig. 3, one float in front and two behind. Fabre originally held the opinion that only a machine fitted with something quite out of the common in the way

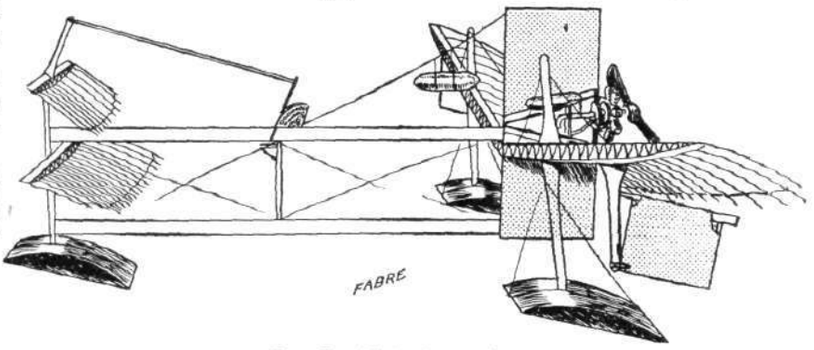


Fig. 3.—Fabre's machine.

of floats would ever rise from the water, and that there were all sorts of difficulties to be overcome in the way of suction, &c., views which we now know to be erroneous. Had some of the experimenters prior to Fabre used machines with more surface, *i.e.*, more lightly loaded, it is quite possible they would have anticipated him. Fabre also made other flights besides the one referred to, one an excellent

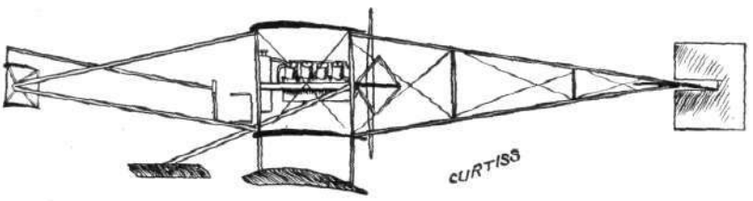
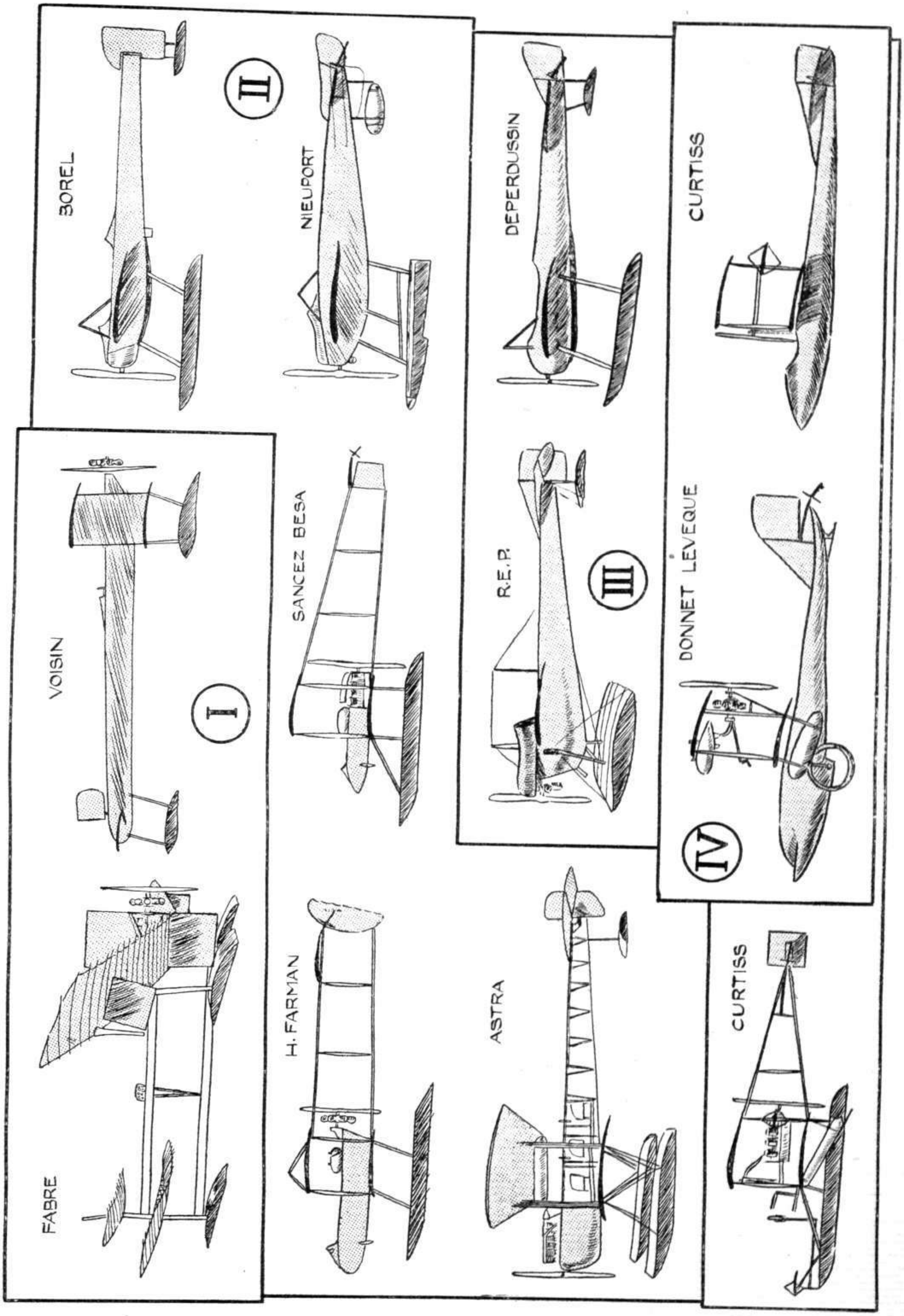


Fig. 4.—Curtiss's first machine.

flight (June, 1910) of six kilometres at a height of 20 metres, but he alighted at too steep an angle and the machine upset.

During 1905 experiments were made by Dr. Barton and Mr. Rawson at St. Helens in the Isle of Wight with a motorless machine towed by a launch. The most interesting part of their machine were the pontoons or floats on which the machine rested, the dimensions were 20 ft. long by 10 ins. wide and 4 ins. deep, the bottom and top were straight, save that the bottom sloped upwards towards the bows and the top downwards towards the stern. The weight of each float was 26 lbs.

In America Professor Langley carried out his experiments over water. In the autumn of 1908 Glen Curtiss mounted his well-known aeroplane "June Bug" on two canoe-like floats, which resembled the type used in certain forms of catamarans (already described). Now, although this was a machine that had flown well over land, and could be made to travel quite fast on the water, the speed



HYDRO-AEROPLANES.—Fig. 5.—Types of Aeroplanes.

reached was never fast enough for it to rise into the air. Curtiss, however, continued his experiments, chiefly in the improvement of his floats, and in 1910, in the Bay of San Diego (California), he succeeded in rising from the surface with a machine fitted with one central float and a small balancing float in front under the elevator, in place of the usual front wheel (see Fig. 4). Finally, Voisin, having fitted his Canard with three Fabre floats, obtained several fine flights on the Seine near Billancourt Bridge in June, 1910 (Fig. 5). The hydro-aeroplane was born.

Many manufacturers then commenced to fit their machines with floats, and since that time hydro-aeroplanes have shown themselves capable of rivaling their elders—the ordinary aeroplanes on wheels—provided the conditions are favourable.

Chief Principles Involved.

The principles involved are of an extremely complicated and often diametrically opposing character, involving as they do not only the principle of the aeroplane and the hydroplane, but that of flotational as well as flying stability, &c., a *pot-pourri*, as it were, of both aeronautical and marine principles. So far as the immediate future of the hydro-aeroplane is concerned, it would appear that advance is more likely to result from practical experiment than theoretical considerations.

Both the aeroplane and hydroplane principle of support are the same, viz., the thrusting or sweeping downwards of a layer of air or water in order to derive the necessary support from the reaction of the same.

In the true hydro-aeroplane, it is one of the chief aims to investigate by actual experiment how far these two principles can be combined in one and the same member. When we endeavour to drive a hydroplane over the surface of the water we have a constantly increasing head resistance in the case of the float, and at the same time a constantly increasing lift or support on the part of the aeroplane surfaces in the air, which also increases with the speed, but far more slowly than the resistance of the water—both water resistance and air support increase with the square of the speed—the former with such large squares as 64, 81, 100 . . . and the latter with such smaller squares as 9, 16, 25 . . . we may thus be unable to raise the machine from the surface of the water, even with the engine running all out, and this in spite of the fact that an appreciable lift takes the float (as a whole) partly out of the water, thereby decreasing the water resistance. Even a slight reduction in the water resistance (thereby enable the float to hydroplane) would enable the machine to fly. Now, suppose, instead of reducing the water resistance we increase the area of the supporting surface, thereby enabling the machine to fly at a reduced speed, *e.g.*, supposing the machine originally designed to fly at 40 m.p.h., but the motor will only drive it through the water at 35 m.p.h., such a machine can be got to rise from the surface of the water either by so improving the floats, *i.e.*, lessening the water resistance so that the machine can travel over the water at the necessary 40 m.p.h., or by increasing the surface so that the soaring speed is reduced to 35 m.p.h. Of course, there is in the latter case the extra weight and resistance to be allowed for and some re-designing would probably be necessary to overcome this. There remains still a third way in which a hydro-aeroplane, fitted with a motor of not quite enough power, could be got to rise, and that is by lowering the centre of propeller thrust. The comparatively speaking high centre of thrust which is necessary in order that the tips of the propeller blades shall clear the water, or it may be the top of the float or floats, tends to drive the nose of the floats under the surface of the water, increase the resistance, and prevent hydroplaning. It may even drive the fore parts of the floats completely under the water and submerge the whole machine; this necessitates placing the centre of longitudinal flotation well ahead of the centre of gravity which at once gives rise to special difficulties of stabilisation while in flight. In one machine (power-driven model), experimented with by the writer, the machine refused to leave the water owing to the high thrust of the propeller driving the nose of the front float into the water. The thrust given by the propeller in pounds was known. A cord was attached to the machine at a point on the same level as the top of the float. A spring balance registering to ounces was fastened to the cord and the machine dragged through the water, when the pull on the balance was about two-thirds the thrust given by the propeller, the machine left the surface of the water and soared, hydroplaning in quite the correct manner off the surface of the water.

This experiment alone being quite sufficient to show the advantage, so far as hydroplaning proper is concerned, of having as low a centre of thrust as possible.

It will thus be seen that we have two distinct types of hydro-aeroplanes, one of which, owing mainly to its large supporting surface, *i.e.*, light loading, is able to rise from the water chiefly by means of its "wing lift," scarcely hydroplaning in the true sense of the word at all; such machines are the large biplanes which leave the water at comparatively speaking low speeds. In the other type the true hydro-aeroplane as opposed to the aeroplane on floats, it is absolutely essential that the machine should hydro-aeroplane in the true sense of the word, such a type (but little as yet in evidence) must be compact and, above all, well powered and possessed of great speed, capable of both rising from and alighting on the surface of rough water, possessing great strength, especially forward, and abundant flotational stability. Such a machine is likely to tax the powers of both designers and constructors to the utmost.

Various Types of Hydro-Aeroplanes.

Although, strictly speaking, there is but one type of hydro-aeroplane in existence, viz., that suitable for lakes and rivers, *i.e.*, for coast defence and lake and river sport, it is convenient to divide them, broadly speaking, into four types:—

1. With three principal floats, either one in front and two behind, as in the Fabre and Voisin-Canard, or two in front and one behind, as in the Caudron (early type). The floats used are almost invariably of the Fabre type. At the Monaco Meeting the Caudron proved itself to be the best of this type.

2. With two long floats fairly near together (the lateral flotational base is generally about one-third the total span), usually of the catamaran type, placed under the principal part of the machine, as in the Astra, Borel, Farman, Nieuport, Wright, Albatross, Sanschez-Besa, Goupy, &c. In some a small auxiliary float is provided, usually placed under the tail. Personally, I consider such a float essential.

3. With one central float, which can be long or short, as in the earlier Curtiss, R.E.P., Train, Wakefield, Deperdussin, &c. Such machines are almost invariably provided with "balancers" or wing-tip floats for lateral balance.

4. The so-called "Flying-Boat" type, *i.e.*, the type in which the principal float is also made to serve the purpose of the main *fuselage* as well as in the Donnet-Leveque, Curtiss (latest type), Gœdeker, &c.

In order to understand why hydro-aeroplanes have been constructed of such varied types it is only necessary to remember that just as there are various types of boats, some specially intended for rapids or rivers, shallows, lakes, &c., and others for the sea, so in the future there will undoubtedly be divers types of hydro-aeroplanes, in all probability, as has already been stated, two chief types—one specially designed for lakes and rivers and for coast work, and the other, which one may perhaps, term the "marine" hydro-aeroplane, will be specially designed for rising from and alighting on the surface of the sea; it is this last-named type that wants and awaits development. It is obviously far easier to design the former than the latter.

(*To be continued.*)

⊛ ⊛

A British Prize for Hydro-aeroplanes.

MR. MORTIMER SINGER has again generously placed at the disposal of the Royal Aero Club a prize of £500, and this time it is to be utilised for the encouragement of hydro-aeroplanes. The conditions of the competition are now under consideration, and will be published shortly.

Naval Airmen at Dover.

UNEXPECTEDLY, in view of a high wind, five aeroplanes descended on Dover on Monday, having flown over from Eastchurch. About noon, Commander Samson and Lieut. Spencer Grey started from Eastchurch on Short tractor biplanes, and an hour later they were followed by Mr. McClean, Capt. Risk and Sub-Lieut. Hewlett, the two former on Short machines, and the last-mentioned on an 80-h.p. Farman. After partaking of lunch with Capt. Marley, of the Dover Aero Club, Commander Samson returned to Eastchurch, the others deciding to remain overnight. During the afternoon, Mrs. Marley was taken for a trip by Sub-Lieut. Hewlett.

⊛ ⊛

Farnborough to Scotland by Aeroplane.

As witness of the fact that the backwardness of the Royal Flying Corps is not due to any lack of enthusiasm among the officers themselves may be taken the keen interest which is being evinced in the proposal that No. 2 Squadron, which has been ordered to the new station at Montrose, should make the trip from Farnborough by the airway. Major Burke is to command the station, and the officers appointed are Capts. Becke and Longcroft, and Lieuts. Herbert, Lawrence, Martyn and Smith-Barry. For the journey North they are to use four B.E. and three Maurice Farman biplanes. It is proposed to start from Farnborough this week, and the course will be *via* Derby, York and Berwick.

Aerial Engineering Works.

WE are asked by Mr. R. F. Steadman, of 126, Eswyn Road, Tooting, S.W., to request that any customers of the Aerial Engineering Works (late of Balham), who have ordered models or parts and have not had delivery of same, will communicate with him, as above, when he will at once see that orders are carried out.

FLIGHT

AERONAUTICAL ENGINES.

Paper read by A. GRAHAM CLARK before the Institution of Automobile Engineers.

(*Continued from page* 48.)

Mercedes Daimler Engines.—There are three different sizes of these engines manufactured, namely, 70, 100 and 240-h.p., the last-mentioned being employed for dirigible work. The 70-h.p. engine is similar in general arrangements to the 240-h.p. excepting that the water pump and magneto are placed at the end of the engine and driven off the crank-shaft, the former direct and the latter through gearing, and that the inlet manifold from the carburettor is taken over the top of the engine, while the suspension is from the top half of the crank-case.

It will be seen from Figs. 9 and 10, that an overhead cam-shaft driven by bevel gear is employed on the 100-h.p. engine, thereby avoiding the use of long push rods which become necessary with the arrangements for both the 70 and 240-h.p. engines.

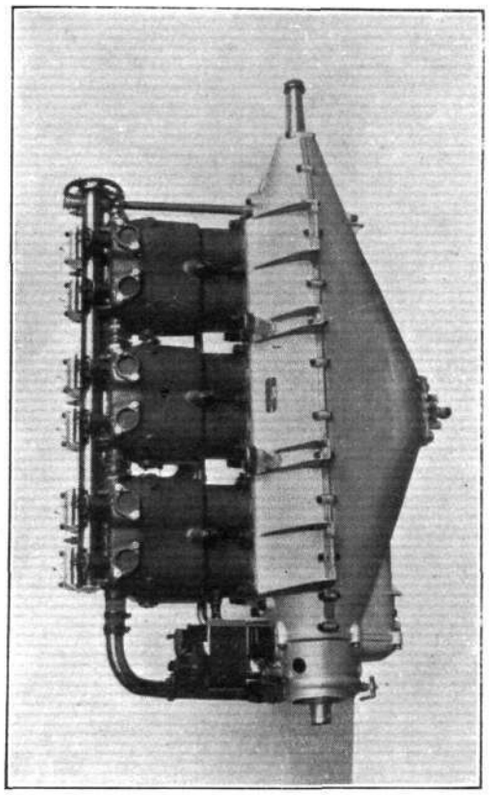


Fig. 10.—100-h.p. Mercedes-Daimler Engine.

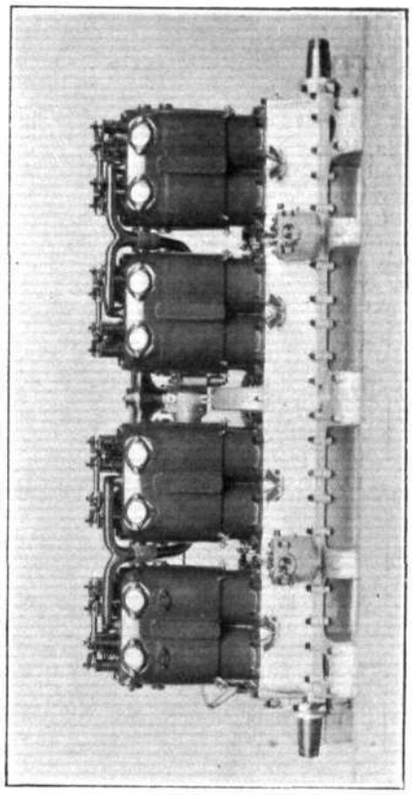


Fig. 12.—240-h.p. Mercedes-Daimler Engine.

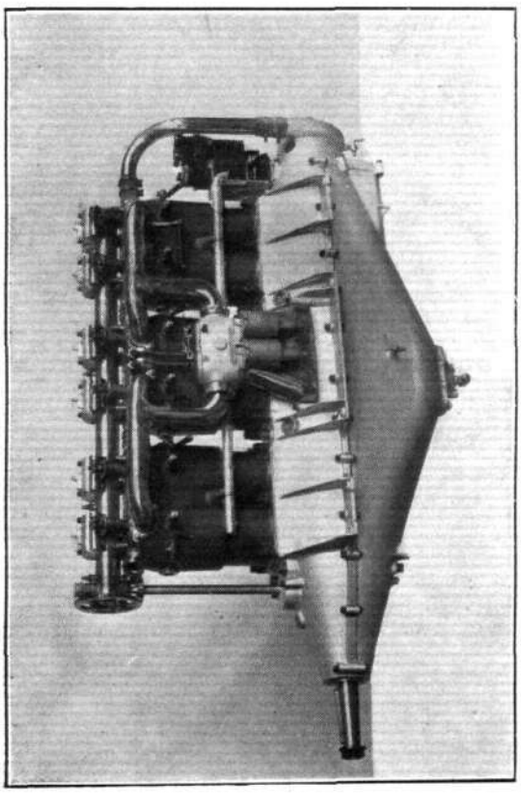


Fig. 9.—100-h.p. Mercedes-Daimler Engine.

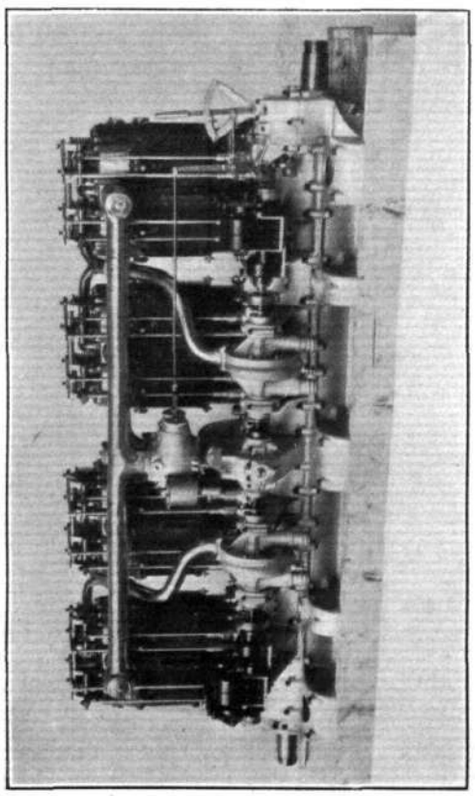


Fig. 11.—240-h.p. Mercedes-Daimler Engine.

The method of circulating the water in the 70-h.p. and the 100-h.p. (Fig. 10) would appear to be capable of improvement, since the discharge from the pump is taken through the cylinders in succession, and hence the last cylinder to receive the water will be at a higher temperature than the first. In the 240-h.p., Figs. 11 and 12, the water is delivered to branch pipes attached to the tops of the cylinders.

Fox Motors.—These are operated on the two-stroke cycle, and the particular class of engines manufactured for aeronautical purposes embody what is termed a "fourth port." The three port type of engine resembles the ordinary two-stroke engine used in this country, excepting that the connection between the cylinder and the crank-case during cylinder induction is by way of a port cut in the wall of the piston beneath the rings and a chamber in the wall of the cylinder, while the main inlet port is formed in the cylinder wall and is covered by the piston when at the bottom of its stroke.

The merit of the "fourth port" lies in the fact that it is so constructed that the direction of the air which alone passes through it (and which is, in addition, passing through the main inlet port), is upwards towards the interior of the piston, so that when the cylinder induction commences, the mixture from the crank-case is preceded by the pure air thus admitted.

The claims made are that greater economy in fuel consumption and greater power are obtained, but it is difficult to see how the latter is effected unless the engine is working inefficiently when on the three port system.

(*To be continued*).

FOREIGN AVIATION NEWS.

New Records Passed.

ON Monday the Commission Sportive Aeronautique officially passed the height record of Garros at Tunis on December 11th as 5,610 metres. It also passed the speed records made by Gilbert at Etampes on December 30th, as follows: 350 kiloms., 3 h. 26 m. 16 s.; 400 kiloms., 3 h. 55 m. 27⅘ s.; 450 kiloms., 4 h. 24 m. 44⅘ s.; 500 kiloms., 4 h. 54 m. 6⅕ s.; 600 kiloms., 5 h. 52 m. 38 s. Four hours, 401·9 kiloms.; five hours, 510 kiloms.

A New Height Record.

DURING a flight of 40 mins. with three passengers on a Henry Farman machine at Buc on the 10th inst., Chevillard established a new height record for pilot and three passengers of 1,500 metres. This is claimed as a new world's record.

Vedrines Beats Speed Records.

ON his 160 Gnome-Deperdussin, Vedrines on the 9th inst. set out to beat the speed records recently made by Gilbert. He was flying over a course between Villesauvage and Montdesir, and after covering about 300 kiloms., landed on some heavy ground near Etampes, the machine being overturned and damaged. Vedrines, however, escaped unhurt. It is claimed that Vedrines' average speed was 133 k.p.h., and that he beat the records for 250 and 300 kiloms., but the figures are not yet available.

The New Passenger Records.

OF the passenger records made recently by Faller on an Aviatik biplane, at Mulhausen recently, three are world's records. They are:—Pilot and 4 passengers, 1 hr. 18 mins.; pilot and 6 passengers, 1 hr., and pilot and seven passengers, 6 mins. 49 secs. His record of 1 hr. 6 mins. with pilot and 5 passengers is a German one only, the world's record being to the credit of Molla with 1 hr. 6 mins. 48 secs.

To Traverse the Simplon Again.

UNDETERRED by the fate of Chavez, his friend and fellow-countryman, Bielovucie has determined to fly the Simplon Pass, although at the present time the weather is against him. He arrived at Brigue on the 8th inst., and has since, by car, thoroughly gone over the route through the pass to Masera, about 45 mins.' journey from Domodossola. Owing to the falling snow he was unable to do any flying until Monday and Tuesday last, and then he only made a trial flight of a few minutes' duration. He is, of course using his favourite Hanriot monoplane.

A Hanriot Hydro-aeroplane.

ON the 10th inst. Barbero was flying on the first Hanriot hydro-avion at Antibes. The machine rose in 80 metres, and flew for 20 mins. over the golf links.

A Three-seater Hanriot.

AT Betheny on the 10th inst., Ponnier gave flights to M. Bernard Jalinque and M. Edouard Gide. Afterwards the two friends desired to go up together, and were taken by Ponnier on the 100-h.p. four-seater, with the result that they decided to become pupils of the school and to order a 100-h.p. three-seater Hanriot.

A Pilot and his Friends.

AT the Blériot School at Etampes, on the 10th inst., Etienne Giraud was visited by some friends, several of whom were given trips, one of 35 mins., including a visit to Issy, another of 30 mins., and a third over Trappes and Chateaufort. On Monday, three more friends were gratified, one, a lady, with an excursion of three-quarters of an hour duration.

Baron Pasquier's Long Flights.

ON the 7th inst., Baron Pasquier returned to Buc on his Blériot from Forges-les-Eaux, where he had been delayed on his return from Dieppe. On the 10th inst. he made a flight of an hour and a half over the aerodrome, while on Monday last he was up for two hours flying over the surrounding country.

At the Blériot School at Buc.

AT the Blériot School, Buc, on the 10th inst., in addition to the fine flights by Giraud and Baron Pasquier, not to mention the numerous trials by the many pupils, Perreyon was testing a machine and took it up to 5,000 metres. In the evening General Hirschauer, accompanied by Cols. Bouttieaux and Vayer, paid a visit to the Blériot quarters and inspected the three latest types of Blériot machine, the Canard, the *Torpille* and the XXXVII, the various special features of each being explained by MM. Blériot and Leblanc.

At the Borel School.

LIEUT. DE LA MORLAYE, on his Borel monoplane on the 10th made a flight of over an hour at Buc, and over the surrounding neighbourhood. Some very fine high flying was also carried out by non-commissioned officers Pinsand, Clamadien and Benoist.

Tabuteau Honoured.

ON Saturday last on the Esplanade des Invalides, Paris, General Michel, the Military Governor of Paris, presented the cross of the Legion d'Honneur to Tabuteau, the well-known pilot, who is a reservist.

Fine Work on Caudrons.

GASTON CAUDRON, on a 50-h.p. machine and Rene Caudron with Sapper Jacquemart on a 70-h.p. Caudron hydro-avion, went from Crotoy to Cayeux on the 7th, and Jacquemart returned on the smaller machine in the afternoon. On the 10th Bosano arrived at Crotoy from Compiegne on a 45-h.p. Anzani-Caudron, and afternoon occupied the passenger seat on a hydro-avion which was being tested by Rene Caudron. Lieut. Gerard, with his mechanic, Allard, flew over to Crotoy from Amiens and later went on to Rue.

English Visitors at Buc.

MISS TREHAWKE DAVIES was at Buc last week, and enjoyed a trip over the surrounding country on her new Blériot, the machine being piloted by Mr. Jas. Valentine.

Long Flights at Nieuport School.

BY way of training for his superior *brevet*, Sergeant St. Andre on the 8th inst. at Villacoublay made a flight of an hour and a half at a height of 500 metres. Later he made some spiral *vol planés* from a height of 800 metres.

Nieuports for Japan.

LIEUTS. SAWADA AND NAGASAWA, of the Japanese Army, have finished their tuition at the Nieuport school at Villacoublay, and ordered two 100-h.p. Nieuport monoplanes. One of these machines was being tested by Bonnier on Monday last.

Cross-Country Flying by Guillaux.

ON his 50-h.p. Gnome-Clement-Bayard, Guillaux started from Issy on the 9th inst. and made a circuit over Levallois, Valerien, Buc, Chateaufort, Juvisy, getting back to Issy just as it was getting dark.

Issy to Juvisy on a Zodiac.

SAPPER RENE LABOUCHERE, accompanied by his mechanic, flew from Villacoublay to Juvisy on his Zodiac on the 8th inst., the passage across Paris being made at a height of 1,800 metres.

Comte de Lambert Continues.

FURTHER trials were carried out by Comte de Lambert with his new hydro-aeroplane over the Seine at Triel on the 7th inst., and afterwards MM. Tissandier and Rene Gasnier, who, it will be remembered, shared with Comte de Lambert the honour of being Wilbur Wright's first "fledglings" in France, were given their first lesson on the new machine.

Some Tests with Farman Machines.

SOME very interesting flying was witnessed at Buc on the 9th inst., when Henry Farman and Chevillard were testing against one another two similar machines, but fitted with differently cambered planes. Trials were made solo and with one and two passengers. Afterwards Henry Farman was experimenting with a new type of landing chassis.

A Blériot Hydro-Aeroplane.

OVER the Seine between Bezons and Argenteuil on Saturday last some trials were made with a hydro-avion built in the Blériot works. Perreyon was in charge of the machine which is, of course, a monoplane, with two seats side by side. It is fitted with an 80-h.p. Gnome, and there are two main floats, with an auxiliary float to support the tail. MM. Louis Blériot and Alfred Leblanc supervised the trials, which included some fifteen flights of varying duration, some with passengers, and among the interested spectators were "Beaumont" and MM. Donnet and Leveque.

New Machines for French Navy.

AT Toulon, on Sunday last, Chas. Nieuport was testing the two 100-h.p. Nieuport hydro-avions built for the French Navy. These machines show considerable advance over the old type, and gave a speed of 110 k.p.h. in the trials. They have openings in the wings so that the observer can get a good view of everything below.

Deperdussins to the Front.

THE two Deperdussin monoplanes ordered by the Servian Government have now arrived at Nish, where they were at once tested by Emile Vedrines to the complete satisfaction of the military authorities.

Prospecting by Aeroplane.

THE Mayor of Rouen having asked the French Government to establish an aviation station at that town, Lieuts. Conney and Cesari were deputed to visit the available ground and report. They flew over on their biplanes on the 10th inst., the journey of 110 kiloms. being made in 1 hr. 20 mins.

Jurisdiction of F.A.I. Upheld.

ON the 9th inst. a decision was given in the French Law Courts in the case brought against the Aero Club of France by the Aeronautique Club of France, demanding the remission of the disqualification which had been imposed because it did not submit for the approval of the F.A.I. the regulations of a certain competition. It was held by the court that by virtue of its affiliation to the F.A.I. the Aeronautique Club was aware of the regulations which it had transgressed, and therefore its appeal was dismissed, and it was condemned to pay all costs.

A German Minister for Aeronautics.

IT is announced from Berlin that the German Government are considering the question of appointing a new Under-Secretary of State, attached to the Ministry of the Interior, to deal with aeronautical matters. This is said to be necessary in consequence of the work which will be entailed when the legislation for regulating aerial traffic, which is now being prepared, is passed.

A Cross-Country Flight in Germany.

ON the 8th inst., Lieut. Veyer, accompanied by Com. Siegert, flew from Metz to Sarneburg, a distance of about 78 kiloms., in an hour and a half.

How they do it in Germany.

THE West German Aeronautic Society having finished the year with a deficit of £7,500, it is announced that the municipal authorities of Herne have made a grant of £9,500 to the Society's funds.

Stations for Aviators in Germany.

AT a meeting held in Berlin last week, it was decided to proceed with the establishment of 18 stations in various parts of Germany at which aviators may be sure of finding supplies. The cost is to be defrayed out of the National Fund.

Large Orders for Austrian Army.

IT is announced from Vienna that the Austro-Hungarian War Office has ordered another large batch of aeroplanes, the majority of which are to be delivered by the end of next month. The full order is said to be for 70 machines, of which 20 will be of the Lohner-Arrow type, and 10 Etrich monoplanes.

Aviation at Brussels Salon.

IN the gallery of the Palais Cinquantenaire, where the Brussels Salon is now being held, there is a collection of aeronautic exhibits which include the Deperdussin, Hanriot, Clement-Bayard, Donnet-Leveque, Nieuport, d'Artois aeroplanes and Gnome motors. There are a number of Belgian-built machines, including the Bronckene, built under Deperdussin licence. A feature of the decorations was the Deperdussin monocoque on which Vedrines made his world's record of 171 k.p.h.

New President for American Aero Club.

ALTHOUGH Mr. Robert J. Collier hoped to be able to continue as President of the Aero Club of America for another year, and was duly re-elected, he has found the many calls upon his time so pressing that he has been forced to relinquish the post. His resignation has been accepted with regret, and Mr. Allan R. Hawley, well known as a balloon pilot, has been elected to succeed. The new President has announced that the Club will do everything in its power to popularise the sport of hydro-aeroplaning, and to this end a Special Committee has been appointed.

Flying in South America.

FLYING across the Rio de la Plata is now quite a common occurrence. On the 11th, Labbe flew from Monte Video to Buenos Ayres in 2h. 40 min. on the Blériot, with which George Newberry had made the outward journey four days previously. The passenger on the home trip was a Uruguayan officer.

Aviation in India.

WITH reference to the proposal to found an Indian flying school at Sitapur, Mr. H. S. Wildeblood has suggested that Rurki would be a much better situation, not only on account of the healthy climate but also because of the presence of the Engineering College and the workshops and foundry, which are shortly to be closed. These could very readily be utilised as an aircraft factory, while the College laboratory could undertake experimental and research work. A suitable ground 5 miles long by 1 mile wide could be arranged as an aerodrome without cutting a tree.

A Chinese Fatality.

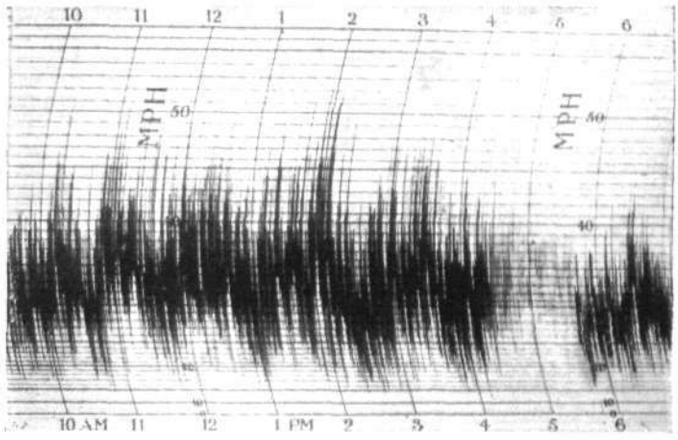
WHILE testing an aeroplane over the East Port at Pekin on December 24th, Fung-Zue, a Chinese officer, lost control of the machine which dived into a bamboo plantation. The pilot was thrown out and killed, but the machine was only slightly damaged and was quickly repaired.

Lieut. Graetz's Latest Project.

HAVING succeeded in his self-imposed tasks of crossing Africa by motor car and by motor boat, Lieut. Graetz is now thinking out the details of a new exploit—to cross New Guinea in an airship. It is proposed to interest both Germany and Great Britain in the scheme, and by way of a preliminary the airship may be piloted from Berlin to London. Should the scheme, which has been submitted to the German Emperor, go through, the airship will be built in Germany, given a British name and manned by a crew half German half British. The expedition is to leave Europe in October and be away two years.

A "RECEIPT" FOR DELIVERY.

THE accompanying wind chart is reproduced from a record of the instrument at the Royal Aircraft Factory at Farnborough for December 12th, 1912, and it is of considerable interest as showing the state of the weather on the occasion of the delivery *by air* of one of the Maurice Farman biplanes ordered by the Government from the Aircraft Co. The period during which the flight from Hendon to Farnborough took place was between the hours of noon and 2 p.m. The chart is recorded by a pen which moves up and down, according to the velocity of the wind, and the scale showing the velocity can be seen against two of the curved lines on the chart. The hour of day is marked along the top and bottom edges of the chart. In steady winds the



record is merely a horizontal line. A gust is indicated by a sudden rise in the line. When the gust is momentary the pen falls again to its original position, and if there is a succession of such gusts the pen jerks up and down, making a wide blurred mark on the record paper. If at intervals certain gusts are notably greater than others the pen shoots upwards, and draws a kind of isolated spire. Thus, in the above diagram, the wind is evidently gusty all the time, but frequently the gusts are much stronger than the average. In short, such a record as the above is very clear evidence of severe weather. Some of the individual gusts between the hours of 12 and 2 p.m. attained a velocity of over 50 miles per hour. On an average there was an exceptionally violent gust, according to the chart, about once in every three minutes. It needs a good and a steady machine to be flown safely in such weather.

Edinburgh Aeronautical Society.

FROM Mr. G. T. Cooper we have received the following particulars of a society which has been formed under the above title in Edinburgh. Mr. Cooper states that the Society aims at encouraging research in the study of aeronautics by giving help to its members in carrying out experiments.

Ordinary members pay an annual subscription of one guinea. Junior members, whose age is under twenty-one, pay half-a-guinea. Any member who, however, makes use of the society's flying machines will be liable to a small extra fee.

Members will have an opportunity of taking part in the construction of aeroplanes, and will have free use of the society's workshop, &c.

Anyone wishing to join, or desiring further information, should apply to G. T. Cooper, 41, Drumsheugh Gardens, Edinburgh.

Models

Edited by V. E. JOHNSON, M.A.

Models for the Beginner.

To the initiated in any subject, all matters connected with it appear more or less simple. To the uninitiated, the reverse is, of course, the case. Everything has to be learnt, no matter however simple. There was a time when even the most expert aeromodellist knew nothing about the flying or even the launching of the most simple model—presuming that the term *simple* can really be applied to anything aeronautical. We wonder how many people, both juvenile and grown-ups, have at some time either purchased or been made a present of a model aeroplane and have failed to obtain anything in the nature of a flight out of the same?

The following article is written for the benefit of those who are interested in aviation but who have not, so far, actually indulged in any flying, model or otherwise: Before the "flying" naturally comes the "buying" of the model—unless it is a present, in which case you may have no choice. To anyone about to buy a model, I would say, don't—unless you are a member of a model club, or, have among your friends a more or less expert aeromodellist—buy a set of parts, simple as it may seem to assemble them. Unless you are something of a model engineer, your chances are more or less against success. When buying a model, never buy a cheap one, or for that matter a foreign-made one, which is, generally, the kind made for show, and not utility, nor to stand any rough usage. The machine should also be one with a single propeller, and of what is known as the loaded elevator or Canard type, *i.e.*, elevator in front, and *not* with a main plane in front of the tail (elevator). On no account purchase a tractor, *i.e.*, one which flies propeller first.

If the model be a present, then the first thing to do is to find out which way it flies—propeller in front or behind—ascertaining at the same time the correct way to wind up the propeller. A case has been recently brought to my knowledge, and it is by no means an isolated one, of the possessor of a simple Bragg-Smith model spending his Christmas holidays in trying to make it fly propeller first. The type of full-sized machine with which the general public is best acquainted, is, of course, the tractor-propeller first type, and they naturally think that models fly the same way.

Now when we look at any propeller we see that it has a convex and a concave side, *i.e.*, the blade is (almost invariably) hollow faced on one side; *now it is this side that should point towards the rear in flight.* A model advances forward owing to the stream of air which it drives or tends to drive backwards, and just as the hollow or curved side of an aeroplane's wing is turned downwards, so in the case of a propeller is this side turned towards the rear.

Having now got our model the right way about, we have next to determine which way to wind up our rubber motor; obviously *we have so to wind it up that when it unwinds it shall cause the propeller to drive the column of air backwards.* As to which way we turn it, clockwise or anti-clockwise, that all depends on the *pitch* of the propeller, like the thread of a screw which may be right-handed or left-handed. If the model has two (twin) propellers, then, having determined (by the method already stated) the correct way for *one* propeller, the other will be wound up in the opposite direction, because it will be of the opposite pitch.

All this you will, of course, have found out at home, before actually setting out to fly your model. Choose a calm day for your first attempt, or, if it be perforce a more or less windy one, select a sheltered spot and test the *gliding* capabilities of your model; in other words, before actually flying your model, you first make a number of experiments on *launching* the same, first for practice, and in the second place to find out if your elevator or small plane is correctly adjusted for actual free flight. Generally speaking, the model should be launched against the wind; there are, of course, some exceptions, but this should invariably be the case for all beginners. Theoretically the model should be launched into the air with the velocity or speed with which it flies. If launched with a velocity in excess of this it becomes at once unstable and has to "settle down" before assuming its normal line of flight. If the launching speed be insufficient, it may be unable to pick up its requisite velocity in time to prevent it falling to the ground. If your model be a monoplane of no great surface, like a Clarke's flyer, it must be launched hard, if a biplane well surfaced like the Bragg-Smith and pointed into the wind, such may be, practically speaking, held up and just released, the model being held by the motor rod in the left hand, whilst the right holds the propeller at or near the boss; release the propeller, and then remove the left hand sharply, giving the model a slight pull forward at the instant prior to doing this.

To return, however, to launching for gliding test, with the motor unwound, in this case the model, no matter how well surfaced, must be *projected* into the air, with its nose *slightly* downwards. Most aeromodellists use two hands for the purpose, some grasp the motor rod or *fuselage* at the centre of gravity, or as near as practicable. In such a case, the machine is held high above the head with the arms outstretched. The model is then thrown forwards, and slightly downwards, the whole body swinging to the movement like an inverted pendulum.

At the moment when it is felt the model is lifting, the fingers grasping the model must be opened out, and the arm drawn swiftly forwards and downwards, or the rear part of the model will catch the hand or wrist.

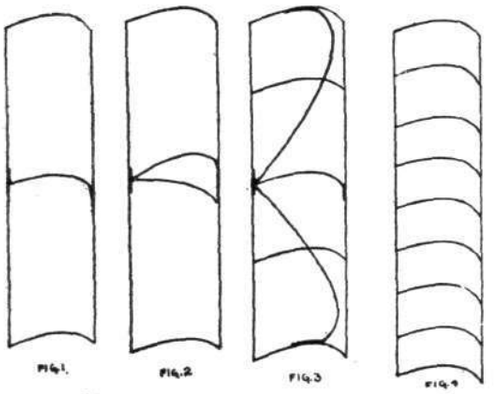
If it is found that the model persists in diving forwards and digging its nose into the ground, then the angle that the elevator plane makes with the horizontal must be increased slightly, not too much, until it is found that the model makes a good even glide. If the model sours up into the air, nose upwards, and then dives, the angle must be reduced.

If the model be a tractor or tail-type, the adjustment is more difficult, because such models are far more sensitive to small differences than the Canard type. If the model soars up into the air and then dives, obviously there is too much lift forward, and if it refuses to rise the reverse is often the case. Such models are frequently adjusted by moving the main plane along the *fuselage*. The beginner should leave such models alone, for he is not so likely, until he has had some considerable experience, to obtain good results with them.

Beginners would do well to confine their attention to models with single propellers and of the biplane type, such as the Bragg-Smith (simple type), which is, from its general configuration, of considerable strength, and will stand a lot of rough usage. It is possessed of exceptionally good stability, and is eminently suitable for a novice. Lubricate your rubber well, and do not overwind it. Be content with a flight of a hundred yards, and carefully note all that happens after making any particular adjustment. Remember, in the above-mentioned type of model you *can* steer by tilting the elevator; find out (by trial and error method) how to do this, *i.e.*, make the model circle either to the right or left, &c., and when you have become proficient in flying such a model, then you can think of passing on to models of a less simple type.

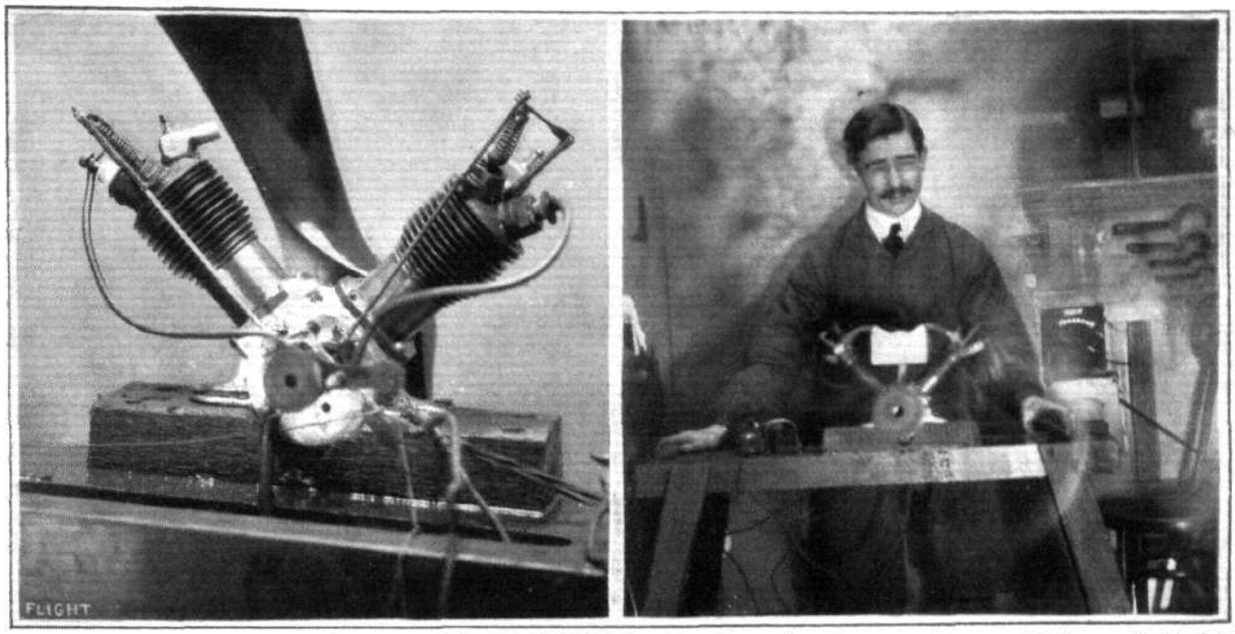
The Cambering of Piano Wire Planes.

The following has been sent us by a correspondent, Mr. S. J. Stevens. We publish the same rather with the idea of inviting criticism and suggestions than because we entirely agree with the



The cambering of wire planes.

methods advocated. The subject is one we are sure in which many aeromodellists are interested. "First make the outside shape the size and form required, carrying it across to form the central rib, as illustrated in Fig. 1, then fix the other two ribs (Fig. 3); these will be found quite sufficient providing you are not constructing a wing of over 30 ins. span. If you are, carry the centre rib across and back, as illustrated in Fig. 2, having fixed the ribs you next solder a piece of finer wire beside the centre rib at the trailing edge of the plane, and carry it under the next rib and solder it to the end of the plane,



THE "BONN-MAYER" MODEL PETROL MOTOR.—On the right the motor is seen driving a 3 ft. 4 in. propeller of 2 ft. 6 in. pitch at 1,200 r.p.m.

letting it run parallel to the end piece for about one and a half inches, as shown in Fig. 3. The same thing is, of course, done to the other side or half of the plane. In the ordinary way the majority of aeromodellists I have come across adopt the method shown in Fig. 4; some occasionally carry an extra rib lengthwise right across the plane. I have found that in covering a plane of this description the wires sometimes give way and turn over, consequently the planes are practically flat, and, in consequence, the models do not give such good results as they would do if properly cambered. I think you will find you get a much stronger plane, and one that will bear the strain of a taut covering without losing its shape, if constructed in the manner I suggest. I have constructed models for the past seven years, although I am only a youth, and from all my experiments I have found the best results when the planes have been constructed in the manner I suggest."

The "Bonn-Mayer" Model Petrol Motor.

We publish this week two illustrations of a new model petrol motor, designed by Mr. F. Mayer (Messrs. J. Bonn and Co., 97, New Oxford Street), which is to be known as the Bonn-Mayer Model Petrol Motor, and which the above-mentioned firm are about to place on the market—the one illustrated has just been delivered to a customer. The photo of the engine alone gives a very clear view of the motor as seen from the rear—showing the ignition gear (out of focus). The weight of the engine alone is under 7 lbs., and complete with battery coil, carburettor, propeller, fuel, and oil, *i.e.*, in complete running order—1·12 lbs. It is hoped that a large model monoplane driven by one of these engines will be complete in time to be exhibited at the forthcoming Show at Olympia in February next. Further particulars will be published later—including propeller thrust, B.H.P. of engine, &c. The plant is being entered at Olympia for the motor test. The photo showing the propeller revolving was taken by means of a two seconds exposure (flash light) and gives a very good idea of the speed. The draught from the propeller acted as an excellent broom, clearing the floor of all dirt, grit, &c. We certainly hope that not only the plant but also the monoplane referred to above will be not only on show but also amongst the competitors at Olympia. Experiments with *large* power-driven models are badly needed, for it is, it appears to me, very largely by actual experiments with such models that the stability problem will in all probability be really solved. In the case of a full-sized machine there is always the personal element—the personal equation of the pilot—to be taken into account, and no mathematical symbol can be found for *that*. A pilot can scarcely be supposed to allow the inherent stability of his machine to reach the limit (presuming he knew it, which as a matter of fact he would not) before applying personal control and adding that unknown personal quantity—*x* or whatever you like to term it—which upsets all further application of mathematical analysis.

I say *large* power-driven models because the meteorological conditions of the atmosphere are such as to preclude more or less the successful application of data culled from experiments with smaller models—to the successful solution of problems affecting full-sized machines.

An Appreciative Letter.

Mr. W. S. Butler, writing from Vista Grande, California, in his communication says: "I am particularly interested in model aviation, and your valuable magazine has helped mein every way. At present I hold all the Pacific Coast model records. I made the first successful r.o.g. and hydro-aeroplane models in this part of the country, and I am having great success. My hand-launched record is 77 secs." We offer Mr. Butler our congratulations on his success.

Model Club for Broadstairs.

Messrs. W. Leighton and Co. (10, Broadway, Broadstairs), writes informing us that it is proposed to form a model club there. A well fitted workshop will be provided, also committee rooms with every convenience. Prizes are also guaranteed by Messrs. Leighton, amongst others for originality of design, good workmanship, distance, duration, &c. In a word everything possible will be done to stimulate interest in model aviation.

Model Club for Lincoln.

Mr. E. M. F. Voss (Ashbourne St. Caths., Lincoln), writes saying that he has, in conjunction with a few friends, started a model club in that city, the club already numbering about a dozen members. He is desirous of hearing from others in that neighbourhood who may be interested. Mr. Ewen has promised the club his support.

Kite Record Altitude.

Will some reader who knows kindly forward post-card containing same? The highest I know of, personally, is 11,080 ft.

⊛ ⊛

KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.

Hand-launched	Distance	A. E. Woollard	...	477 yards.
	Duration	A. F. Houlberg	...	89 secs.
Off ground	Distance	G. Rowlands	...	232 yards.
	Duration	A. F. Houlberg	...	51 secs.
Hydro, off water	Duration	G. P. Bragg-Smith	...	25 secs.
Single-tractor screw, hand-launched	Distance	H. R. Weston	...	84 yards.
	Duration	F. W. Jannaway	...	22 secs.

Official Trials.—The official trials fixed for Saturday last, January 11th, had to be postponed on account of the severe storm and fog. These will take place this afternoon (18th) at same time, viz., 3 p.m., on the Aero Models (Northern Branch) Ground, East Finchley.

Official Observers.—Applications for appointment as official observers have been received and the appointments made will be published in next issue.

International Aero Show.—The place and date of the flying tests will be decided in a few days, after the various suggested places have been inspected. Also the judges selected will be appointed.

Membership.—The Council appeals to all those interested in aeronautics to join the Association. Proposal forms will be sent on application.

27, Victory Road, Wimbledon, S.W. W. H. AKEHURST, Hon. Sec.

MODEL CLUB DIARY AND REPORTS.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Aero-Models Assoc. (N. Branch) (15, HIGHGATE AVENUE, N.).
OWING to the extremely adverse weather conditions which prevailed last Saturday, the trials for the K. and M.A.A. records were postponed and will be held to-day at Finchley.

Leytonstone and District Aero Club (64, LEYSPRING ROAD.)
JANUARY 18TH AND 19TH.—Flying as usual. Members interested are reminded about Tuesday, January 21st, at 8 p.m.

Manchester Model Ae.C. (14, WARWICK RD. N., OLD TRAFFORD).
JANUARY 22ND.—General meeting at Brownsfield Mill, Great Ancoats Street, at 8 p.m. All members and prospective members are invited so as to arrange the procedure for the coming season.

Sheffield Model Aero Club (35, PENRHYN ROAD, SHEFFIELD).
JANUARY 18TH.—Meeting for duration (weather permitting) at Standhouse Aerodrome, opposite Manor Castle, 3 p.m. prompt.

S Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).
MEMBERS of the above club will meet during the week-end (January 18th and 19th):—January 18th, at Kidbrooke, 2 p.m. till 4.30 p.m.; January 19th, at Blackheath, 8 a.m. till 10 a.m.; January 19th, at Lee Aerodrome, 10.15 a.m. till 12.15 p.m.; January 19th, at Chislehurst (Cricket Ground), 2 p.m. till 4.30 p.m., by members of the Chislehurst and District Aero Club.

CORRESPONDENCE.

Correspondents communicating with regard to letters which have appeared in FLIGHT, would much facilitate ready reference by quoting the number of each letter.

The British Industry.

[1709] Will you permit me to use your columns in order to say a few words about the present state of the British industry and its need for adequate financial encouragement? I do not think everyone realises the situation as it really exists, and although I have hesitated much before calling attention to what is admittedly a weakness, nevertheless I feel that the time has come to speak plainly.

Aviation has advanced immensely during the past year, and several British designers have shown their ability to produce machines equal to the best that have come from France; they have laboured in the face of enormous difficulties and they have gained their point.

Now, in France and other countries, a designer who shows his worth can obtain almost unlimited financial support. Not so in England. Here a constructor gets no financial assistance whatever. Not only does he find it impossible to obtain money for experimental work, but he is even refused backing when he actually has the orders in hand. I know personally of several good orders that would have been very profitable undertakings which have been lost to England through the inability of British manufacturers to finance the contract. Consequently the money has been spent in France, not, bear in mind, because French machines are better than English machines, but only because the Frenchman is in a better position to carry out the work from a financial point of view.

I do not think people fully realise the expenses incurred by firms in the aviation industry. They have to pay the salaries of qualified pilots and to bear the expense of constant trial flights, which involve a heavy outlay in fuel and oil alone. In itself this is, of course, no more than an incidental expense proper to the conduct of the business, but to the inadequately financed small firm the incessant outlay is an ever-present anxiety. The desire to improve a machine with a new pair of wings or a new propeller has to be studied as much from the point of view of economy as from the point of view of improvement, which is not as it should be in these days of rapid progress.

If the factories that have gained their experience at so much cost to themselves are forced to close down through lack of financial support, the loss will be a severe one to England. It has been apparent to me, as it must have been evident to many others, that the welfare of the British industry is vital to the country in this matter. No one could have interpreted Col. Seely's remarks in any other sense. Our national characteristic is, unfortunately, to appear apathetic, and it is apparently against the policy of the Government to do anything by way of direct encouragement of the industries on which it must needs rely. There remains, therefore, the absolute necessity of establishing the aviation industry with capital provided by enterprise.

Many of those who have spent their private means in giving practical expression to their ideas of how an aeroplane should be built are not at all in the position to finance their own businesses on a scale adequate to the growing demand of the undertaking. The irony of the situation is keen. Some of those who, after years of really hard self-denying labour, have succeeded in establishing themselves are faced with the prospect of being buried under the ruins of their own success. The orders that they could successfully execute they are unable to undertake, and just when they ought to be repaying themselves for the labours of past years their efforts have every appearance of being in vain.

I feel, Sir, that FLIGHT is read by many who are able directly or indirectly to relieve the present difficulty, which I can assure you is unquestionably real. It may be, therefore, that some who are thus situated will see my letter and be inclined to come forward to the assistance of those who have otherwise won to lose. If I thought that the outlook were other than satisfactory from the capitalists' standpoint, I would not have made this appeal. I do not pretend that the aviation industry is at present a gold mine, but I do see every reason why it should be a profitable undertaking for those who are willing to stake something on the experience of the men who know.

Not every venture in life is governed by the mere consideration of the profit at the end of it. Interest, happily, is an important factor in the situation, and it is my hope that some of those who read this letter may be impelled by a feeling of interest to take a personal stake in the industry. The time will come, I believe, when some of the larger engineering firms will see in the building of aeroplanes an eminently desirable field for their own energies, but the building of aeroplanes is not a job that can be turned over to the drawing office and placed under any chief draughtsman with any chance of success. Those who have made any pretence at studying aeroplane construction cannot fail to have been impressed with the extent to which a successful issue depends on the personal experience of the designer. The aeroplane is very much like the sailing yacht in this matter; anything that will keep out the water may be termed a boat, but it needs something more than that to be worthy of the name all the same.

I feel very strongly that it is a case of now or never. There is a chance to buy that experience at the present time which may never recur, and I venture to think that a sense of public spirited interest should alone suffice to bring forward a purchaser, for I can only reiterate what I firmly believe, namely, that every British engineer of experience who is forced to leave the business at the present juncture will be a real loss to the country in future years.

"A BELIEVER IN AVIATION AND IN ENGLAND."

A Disclaimer.

[1710] The reference in your last issue "to fitting a 45-h.p. engine to a machine built to take a 28" is so obviously intended for our Blériot pattern monoplane, that "we should like to know" whether the person who suggested such a misleading inference to you was inspired by altruism or—something else?

Whether he knew that the machine had been specially rebuilt to carry the 45-h.p. engine, which he could easily have verified?

And whether he will now "think it over" himself, and realise the fact that there is no sort of analogy between the two cases which seem to have stirred his kindly interest in the matter? As a distinct imputation has been conveyed to you, I am quite sure that in common fairness to us you will publish this refutation.

Temple School of Aviation, London Aerodrome.
G. T. TEMPLE.
G. LEE TEMPLE.

[Other correspondence held over.—ED.]

Aeronautical Patents Published.

Applied for in 1911.

Published January 16th, 1913.

28,815. E. KELLER. Flying-machine.

FLIGHT.

44, ST. MARTIN'S LANE, LONDON, W.C.

Telegraphic address: Truditur, London. Telephone: 1828 Gerrard.

SUBSCRIPTION RATES.

FLIGHT *will be forwarded, post free, at the following rates:—*

UNITED KINGDOM.	s.	d.	ABROAD.	s.	d.
3 Months, Post Free ...	3	9	3 Months, Post Free ...	5	0
6 ,, ,, ...	7	6	6 ,, ,, ...	10	0
12 ,, ,, ...	15	0	12 ,, ,, ...	20	0

Cheques and Post Office Orders should be made payable to the Proprietors of FLIGHT, 44, St. Martin's Lane, W.C., *and crossed London County and Westminster Bank, otherwise no responsibility will be accepted.*

Should any difficulty be experienced in procuring FLIGHT *from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.*